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BOOMtown: A Momentary Community

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BOOMtown:

A momentary community

Finding a cure for the housing crisis in
emerging boomtowns



BOOMtown:

a momentary community

by Elizabeth Hawks

A design thesis presented to the faculty of The College of Architecture at the University of Nebraska-Lincoln in partial fulfillment of requirements for the degree of Master of Architecture.

Major: Architecture

Under the supervision of Professor Brian Kelly

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May 2013



Image of a Horizontal Well north of Williston ND.
Photo by Elizabeth Hawks. July 2012.

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Gillette Syndrome:

is the social disruption that can occur in a community due to rapid population growth. Such disruptions usually include increased crime, degraded mental health, weakened social and community bonds, abnormally high costs of living, and other social problems. Gillette Syndrome is most relevant to boomtowns that are growing rapidly due to nearby natural resource extraction, such as coal mining or natural gas drilling.

[Kohrs, El Dean, "Social Consequences of Boom Growth in Wyoming"]

Abstract

“Gillette Syndrome” describes a condition within a city undergoing rapid growth, usually due to the introduction of a new industry within the city or more specifically, the extraction of a newly discovered natural resource.¹ Symptoms of the syndrome are an increase in crime and decay within a city and a decrease in community identity.

Global oil prices continue to rise as the resource becomes more difficult to extract from the earth’s layers. The new price of oil necessitates the extraction of crude through methods that were previously too expensive to justify. These new methods are utilized for extracting oil in areas thought to be unproductive in the past.²

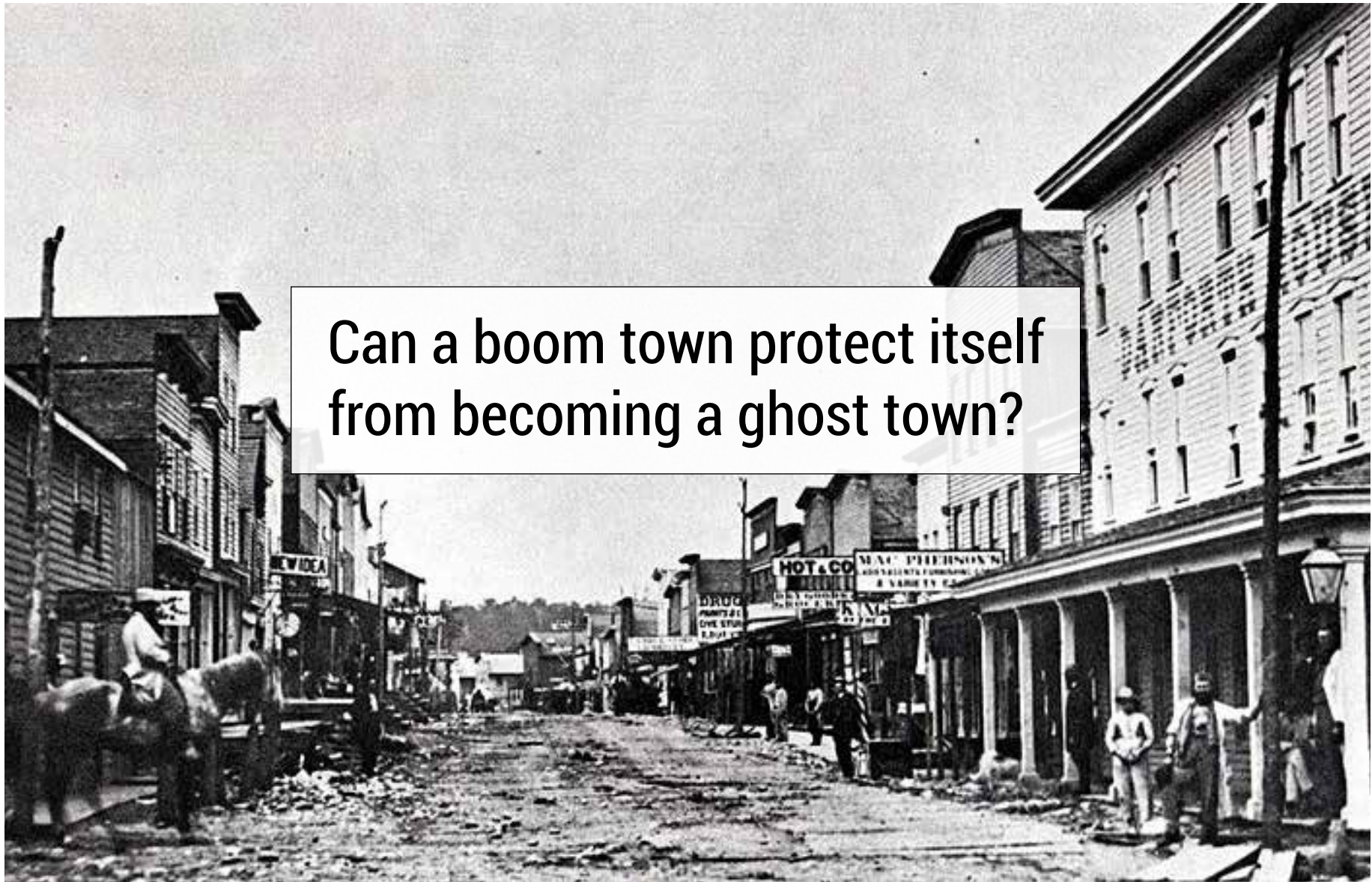
These new, mostly rural or remote areas now hold the potential to burst with economic activity. Currently, Western North Dakota is experiencing such an economic boom.

However, the nature of the oil extraction reveals a limited time-line for the life of the boom. Without supplemental means for sustaining the influx, the city will eventually return to a more sustainable population, though this is after having to support the needs of a city double in size for 20 - 30 years.

The question then becomes, **how can these remote cities avoid becoming a ghost town when the overnight expansion is over?** Is it ok for the city to be taken advantage of and left for dead? Or **is there a way to supply for the needs of the boom while planning for a graceful decline into normalcy once the industry has moved on?** Can these new practices be mobile so as to assist in the sustaining of remote towns wherever the industry may go next?



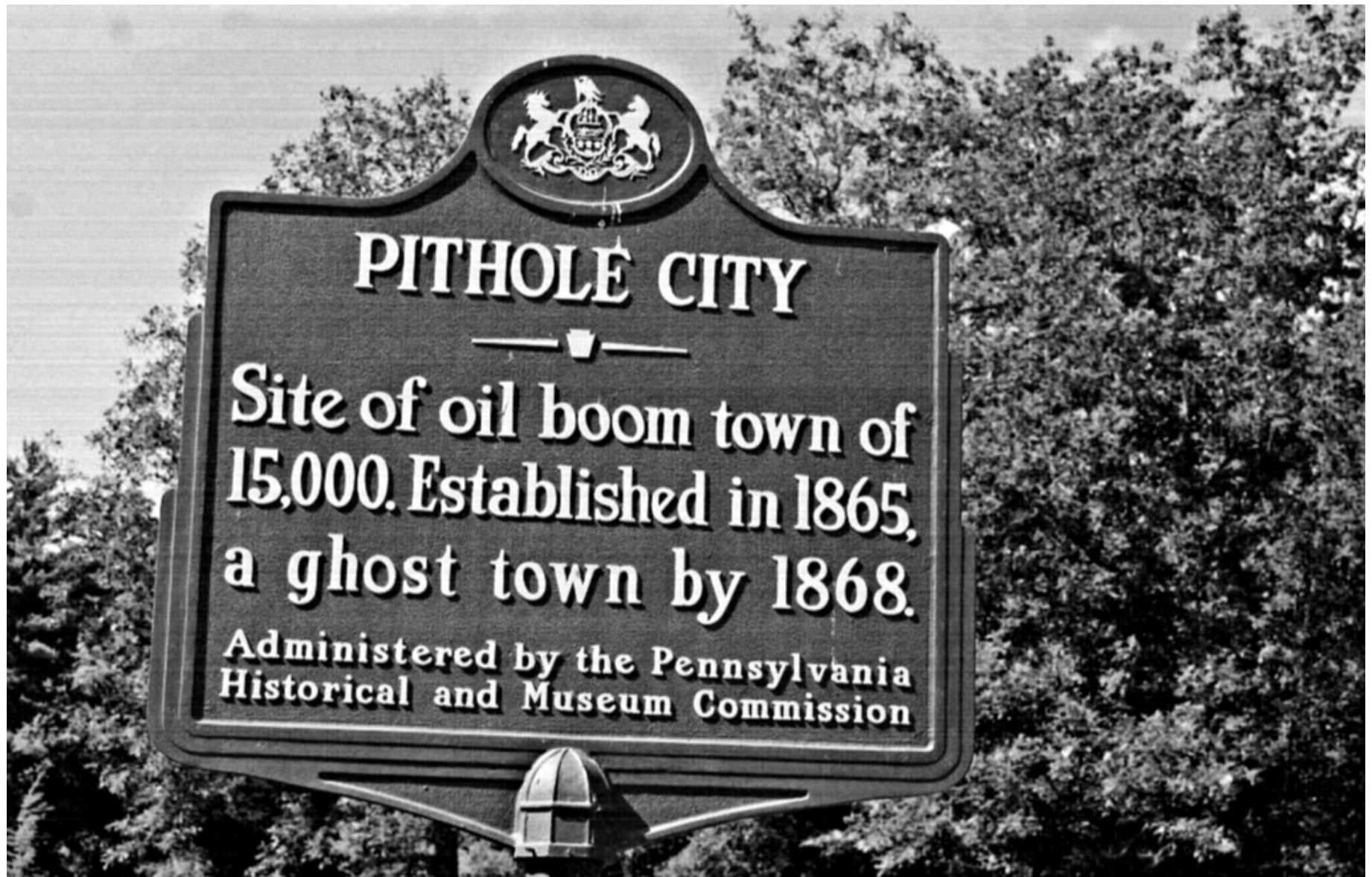
Image of company-owned housing development in Williston ND. Photo by Elizabeth Hawks. July 2012.



Can a boom town protect itself from becoming a ghost town?

[top] Pithole City in the midst of the short-lived boom in early Pennsylvania. [http://commons.wikimedia.org/wiki/File:Pithole_Holmden_Street.jpg]

[right] A sign currently in Pithole City, Pennsylvania marking what used to be the town. Currently all that is left of the town are decaying remains of oil derricks, and outlines of old roads that used to line the town. [<http://www.flickr.com/photos/andyarthur/7710531134/>]





An image of the first succesful "Drake" oil well. [Library of Congress. <http://www.loc.gov> (accessed July, 2012)]

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BOOMTOWN HISTORY

The oil industry is only one of many natural resource industries that can bring an economic gilded age to the surrounding communities. Though, alongside wealth and population, the boom can also bring a community its share of new problems.

Battlement Mesa, Colorado

Original Resource: Oil

Current Status: Retirement Community

Originally, oil was found in Colorado in the 1970's by Colony Oil Company.³ The area was then sold to Exxon Mobil, who immediately began development on a \$5 million company town. In 1982, oil prices dropped steeply and suddenly. Exxon shut down the oil field, laying off all workers in the area. For years, the settlement sat empty, becoming a burden on the county, facing demolition until the area became popular for retirees. It is now a 3200 acre homeowners association for mostly retirees. In 2010 the census recorded 4,471 residents.



www.maps.google.com



www.centerwest.org/publications/oilshale/3engineering/6blacksunday.php



www.historic-structures.com/CO/battlement_mesa/



www.nps.gov/history/history/online_books/blm/cultresser/co/12/chap11

[from left] Aerial image of Battlement Mesa, CO. Battlement Mesa, CO development images.

Bodie, California

Original Resource: Gold

Current Status: Ghost Town

Bodie, California is the site of one of the first gold mining towns of the California gold rush. Gold was first discovered in the area in 1876 by Standard Co.⁴ By 1879, the mining town was home to 5,000 to 7,000 miners and over 2,000 buildings. Gold production in the area brought in nearly \$34 million and was shipped to nearby Carson City, Nevada for processing. The main road was only a mile long and home to over 65 saloons at one point. By 1913, the gold mine was dry and closed down. The town was emptied shortly thereafter, becoming what it still stands today, a ghost town. Bodie became a national historic landmark and 170 buildings still remain as an image of what a gold rush town used to be.



www.maps.google.com/



yesteryearsnews.wordpress.com/2009/09/21/



Free Public Domain Photo Database

[from left] Aerial image of Bodie, CA. Images of the remains of Bodie, California.

Skagway, Alaska

Original Resource: Gold

Current Status: Tourist Town

The Klondike gold rush began in 1896 with the discovery of gold along the Klondike River.⁵ Skagway, Alaska became a busy port city as it was the best way for miners to enter the Yukon gold fields. By 1898 the town had over 8,000 residents and saw over 1,000 miners pass through weekly to try and find gold. Over time, a railroad was introduced and people unwilling to risk the oil field stayed in Skagway to provide goods and services to miners. During its peak, the town was overrun by teamsters and was described as “lawless.” John Muir described the town as, “a nest of ants taken into a strange country and stirred up by a stick.” As the gold mines emptied, the town dwindled. It is now home to 800 year round residents and has become a popular tourist stop for cruise ships in the summer.



[www.maps.google.com]



www.nps.gov/nr/twhp/wwwlps/lessons/75skagway

[from left] Aerial image of Skagway, AK.
Current image of Skagway, AK. Image of
Skagway during gold rush.

Sparrows Point, Maryland



www.maps.google.com



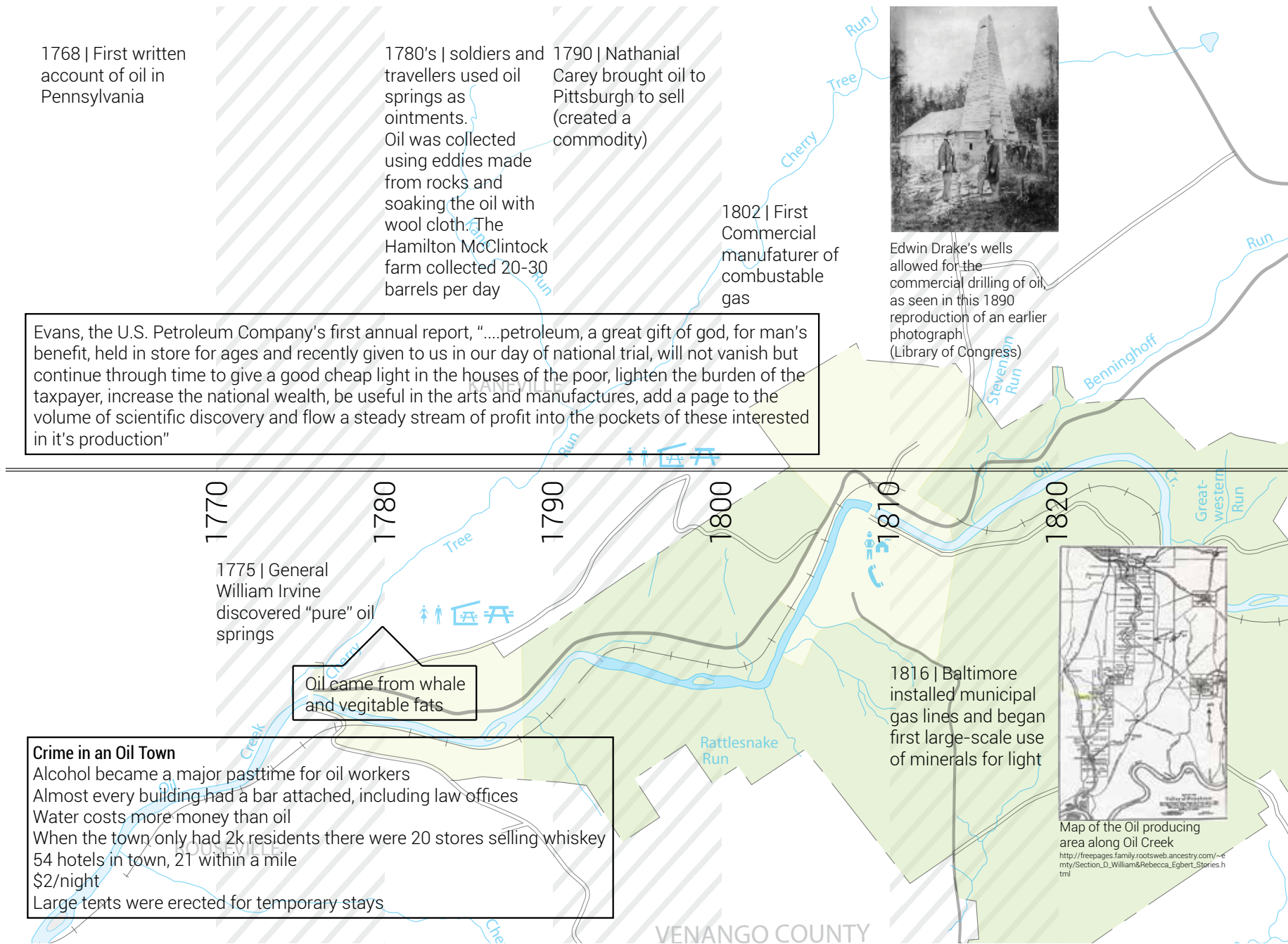
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Original Resource: Steel

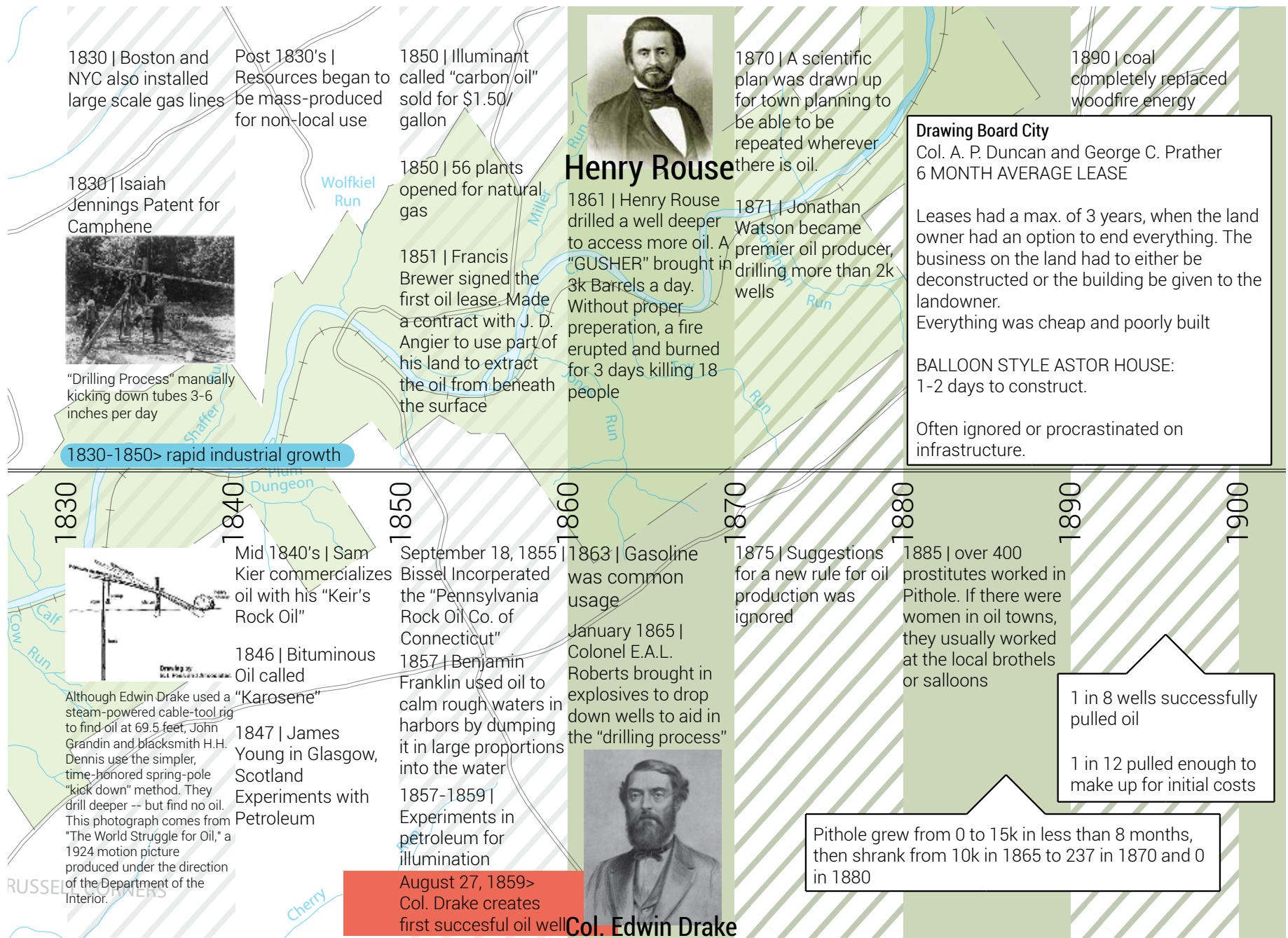
Current Status: Empty Town

Baltimore, Maryland in its prime was unmatched in the variety of industries which made the town so successful.⁶ The peninsula of Sparrows Point became a ship yard and steel plant for Bethlehem Steel in 1889. The plant was the largest in the world. On the same peninsula, housing was set up for the plant workers. Housing was separated based on race and job type. Row houses were for plant workers while larger individual family homes housed managers and their families. The company also had stores and places of entertainment. As mobilization increased and people were able to afford longer commutes, the town near the factory dwindled. The homes began to be demolished in the 1970's leaving behind only continued work until the early 2000's when Bethlehem Steel went under.

[from left] Aerial image of Sparrows Point, MD. Images of housing on Sparrows Point during peak production.



[Fig. 01] A time-line of the beginning of oil usage and production in the United States. [Information from: Petrolia: The Landscape of America's First Oil Boom by Brian Black.]



The Petroleum Boom

1768 | First written account of oil in Pennsylvania

1780's | soldiers and travellers used oil springs as ointments. Oil was collected using eddies made from rocks and soaking the oil with wool cloth. The Hamilton McClintock farm collected 20-30 barrels per day

1790 | Nathaniel Carey brought oil to Pittsburgh to sell (created a commodity)

1802 | First Commercial manufacturer of combustible gas



Edwin Drake's wells allowed for the commercial drilling of oil, as seen in this 1890 reproduction of an earlier photograph (Library of Congress)

Evans, the U.S. Petroleum Company's first annual report, "....petroleum, a great gift of god, for man's benefit, held in store for ages and recently given to us in our day of national trial, will not vanish but continue through time to give a good cheap light in the houses of the poor, lighten the burden of the tax payer, increase the national wealth, be useful in the arts and manufactures, add a page to the record of scientific discovery and flow a steady stream of profit into the pockets of these interested in its production"

1768 Oil First Found in Pennsylvania

1775 | General William Irvine discovered "pure" oil springs

Oil came from whale and vegetable fats

Crime in an Oil Town

Alcohol became a major pasttime for oil workers
Almost every building had a bar attached, including law offices
Water costs more money than oil
When the town only had 2k residents there were 20 stores selling whiskey
54 hotels in town, 21 within a mile
\$2/night
Large tents were erected for temporary stays

1816 | Baltimore installed municipal gas lines and began first large-scale use of minerals for light



Map of the Oil producing area along Oil Creek
http://freepages.familyrootsweb.ancestry.com/~6mty/Section_D_William&Rebecca_Egbert_Stories.htm

1830 | Boston and NYC also installed large scale gas lines

Post 1830's | Resources began to be mass-produced for non-local use

1850 | Illuminant called "carbon oil" sold for \$1.50/gallon

1850 | 56 plants opened for natural gas

1851 | Francis Brewer signed the first oil lease. Made a contract with J. D. Angier to use part of his land to extract the oil from beneath the surface



Henry Rouse

1861 | Henry Rouse drilled a well deeper to access more oil. A "GUSHER" brought in 3k Barrels a day. Without proper preparation, a fire erupted and burned for 3 days killing 18 people

1870 | A scientific plan was drawn up for town planning to be able to be repeated wherever there is oil.

1871 | Jonathan Watson became a premier oil producer, drilling more than 2k wells

1890 | coal completely replaced woodfire energy

Drawing Board City

Col. A. P. Duncan and George C. Prather
6 MONTH AVERAGE LEASE

Leases had a max. of 3 years, when the land owner had an option to end everything. The business on the land had to either be deconstructed or the building was given to the landowner. Everything was cheap and poorly built

BALLOON STYLE A-frame HOUSE:
1-2 days to construct.

Often not finished or procrastinated on infrastructure.

1830 | Isaiah Jennings Patent for Camphene



"Drilling Process" manually kicking down tubes 3-6 inches per day

1830-1850> rapid industrial growth

1830



Although Edwin Drake used a steam-powered cable-tool to find oil at 69.5 feet, 1835 Grandin and blacksmith John Dennis use the simpler, time-honored spring-pole "kick down" method. They drill deeper -- but find no oil. This photograph comes from "The World Struggle for Oil," a 1924 motion picture produced under the direction of the Department of the Interior.

1840

Mid 1840's | Sam Kier commercialized oil with his "Kier's Rock Oil"

1846 | Luminous Oil used for "Camphene"

1847 | James Young in Glasgow, Scotland Experiments with Petroleum

1851
First Contract to Extract Oil

September 18, 1851 Bissel Incorporated the "Pennsylvania Rock Oil" of "Conococheague"

1851 | Benjamin Franklin used oil to calm rough waters in harbors by dumping it in large proportions into the water

1857-1859 | Experiments in petroleum for illumination

August 27, 1859> Col. Drake creates first successful oil well

1859
First Successful Well

1863 | Gasoline was common usage

January 1865 | Colonel E.A.L. Roberts brought in explosives to drop down wells to aid in the "drilling process"



Col. Edwin Drake

1870

1875 | Suggestions for a new rule for oil production was ignored

1880

1885 | over 400 prostitutes worked in Pithole. If there were women in oil towns, they usually worked at the local brothels or saloons

1890

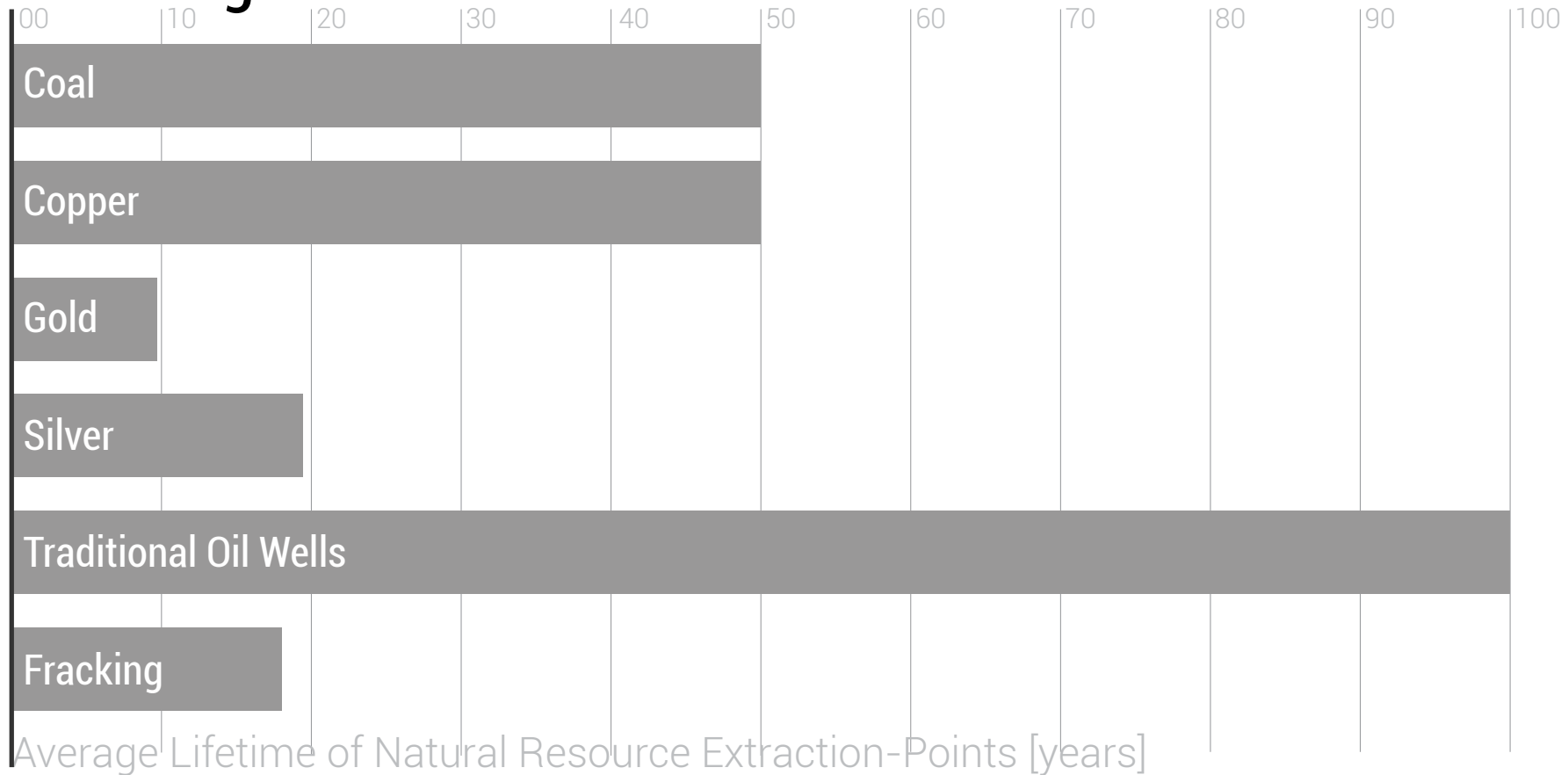
1 in 8 wells successfully pulled oil

1 in 12 pulled enough to make up for initial costs

1900

Pithole grew from 0 to 15k in less than 8 months, then shrank from 10k in 1865 to 237 in 1870 and 0 in 1880

Booming Natural Resources



The difference in the types of natural resources extracted from an area, as well as the methods used can make huge differences in the effects on surrounding communities. Oil extraction, at its most efficient, is extracted from

deep wells which can produce for up to 100 years, while gold is a resource that is only reliable in the best mines for about 10 years of production. This determines what sort of community grows around the productive area. In short-lived

mining operations, temporary communities are created while whole metropolitan areas can arise and thrive from successful, long-term natural resource extractions.

[Fig. 02] A graph of estimated lengths of production for various natural resources.



Hydraulic fracturing horizontal well. [Picture taken in Williston, ND. July 2012]



Bingham Canyon Copper Mine. April 2013. [<http://www.ksl.com/index.hp?page=1&sid=24748916&nid=460>]



Globe, Arizona Coal Strip Mine. 1990. [Photo via PhillipC via Flickr CC]



Vertical Oil Well. [Picture taken in Williston, ND. July 2012]

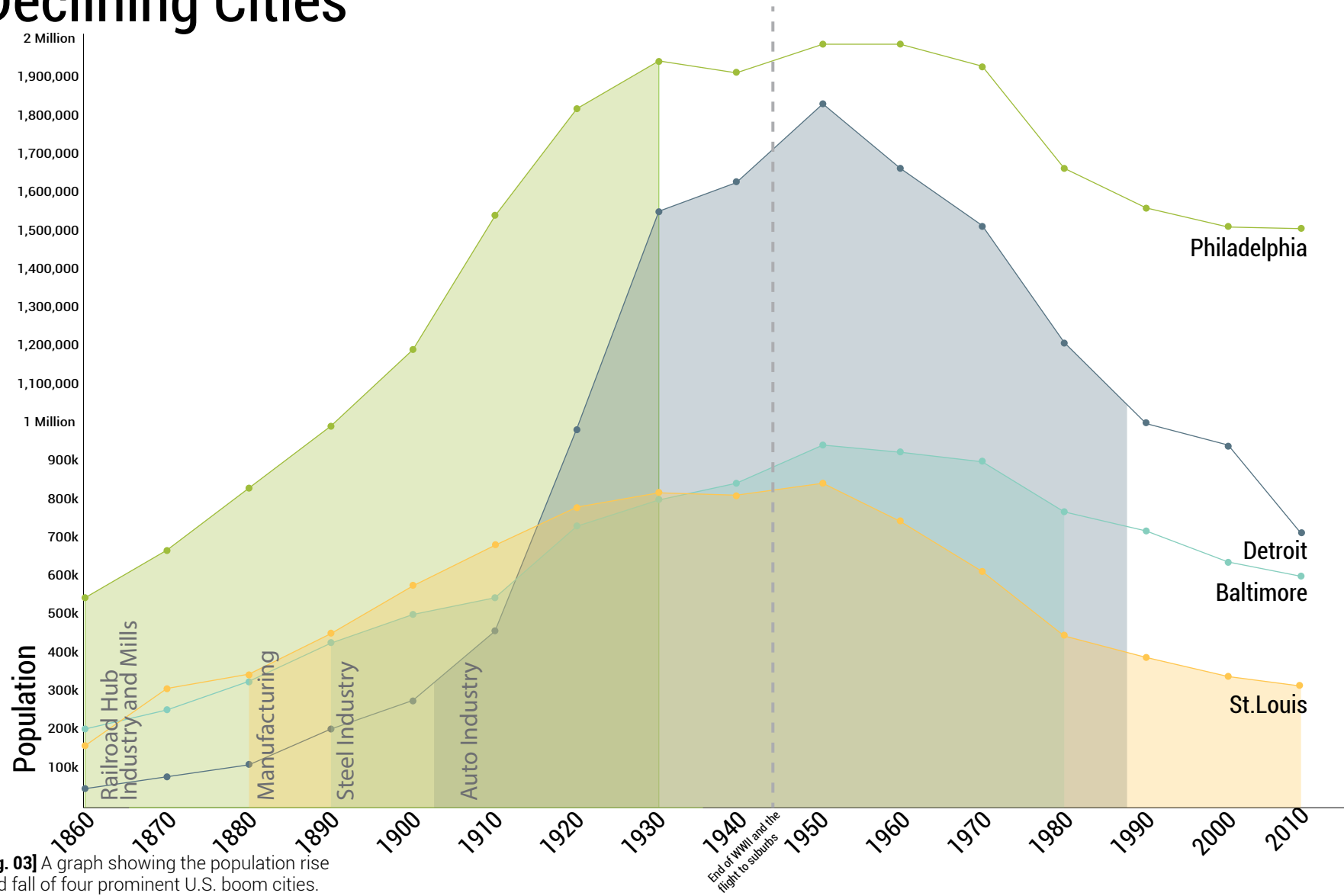


Historic Sutter Gold Mine. February 2011. [<http://www.nytimes.com/2011/02/11/us/11gold.html?pagewanted=all&r=0>]



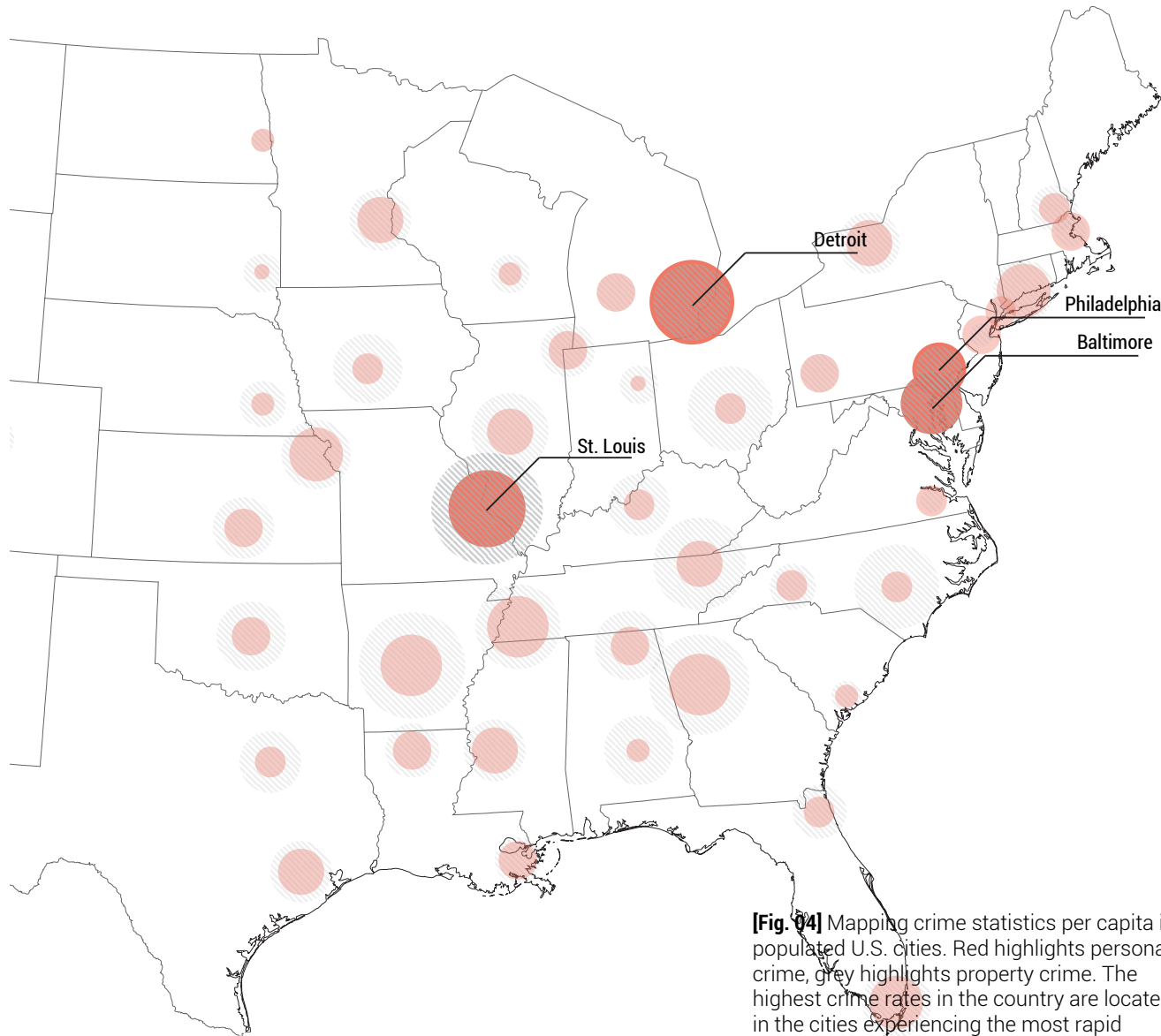
Underground Illinois coal mine. Early 1900's. [<http://www.mining-artifacts.org/Illinois-Mines.html>]

Declining Cities



[Fig. 03] A graph showing the population rise and fall of four prominent U.S. boom cities. The graph also highlights the original boom industry and when that industry ended.

U.S. Crime per capita



[Fig. 04] Mapping crime statistics per capita in populated U.S. cities. Red highlights personal crime, grey highlights property crime. The highest crime rates in the country are located in the cities experiencing the most rapid decline in population.

Some of the most well known boom towns in the U.S. are the towns currently in a state of rapid decline. Most notably: Detroit, Philadelphia, Baltimore and St. Louis. These towns all grew steadily in the early 1900's due to the growth of a single industry. Detroit was the hub for automobile manufacturing, the railroad industry lead in Philadelphia, steel in Baltimore and manufacturing in St. Louis. Each of these cities grew to be some of the largest in the United States. After World War II and the flight of workers to the suburbs, manufacturing and mills also fled the city. Slowly the main industries that upheld the towns were distributed and the cities suffered greatly. The cities lost population almost as quickly as it rose, leaving the city full of dilapidated homes, foreclosures, and crime-ridden communities. The cities studied have the highest crime rates in the U.S. today, one of the largest problems for communities with declining population.⁷

1. Kohrs, El Dean (1974), "Social Consequences of Boom Growth in Wyoming". Paper presented at the Annual Meeting of the Rocky Mountain American Association for the Advancement of Science in Laramie, Wyoming.
2. Walsh, Bryan. "The Future of Oil." Time 9 Apr. 2012: 28-35.
3. Hanson, J. "Town of Battlement Mesa a Legacy of the Boom." Oct. 8, 2009. [<http://www.centerwest.org/publications/oilshale/7new/?p=112>]
4. www.bodie.com
5. "Skagway: Gateway to the Klondike." National Park Service. [<http://www.nps.gov/nr/twhp/wwwlps/lessons/75skagway/75skagway.htm>]
6. Smith Hopkins, Jaime. "Company town is gone, but it lives on in its residents." The Baltimore Sun, August 18, 2012. [http://articles.baltimoresun.com/2012-08-18/business/bs-bz-sparrows-point-town-reunion-20120818_1_rg-steel-sparrows-point-steel-mill]
7. "Crime Statistics." FBI. N.p., n.d. Web. 10 Dec. 2012.



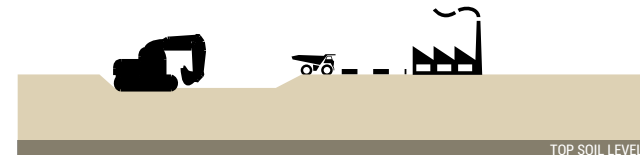
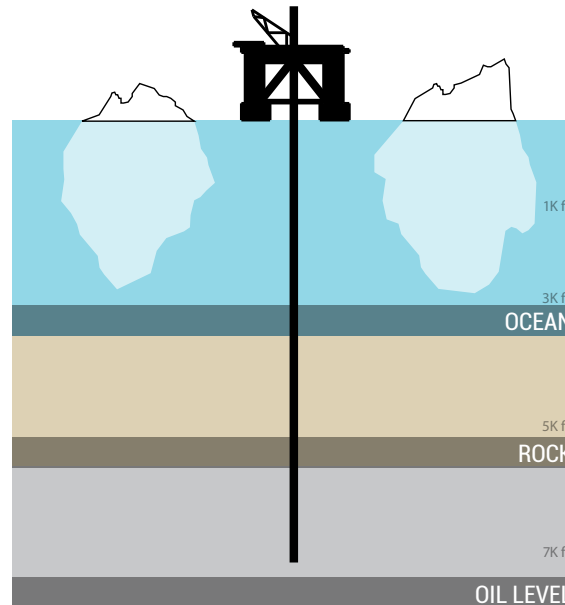
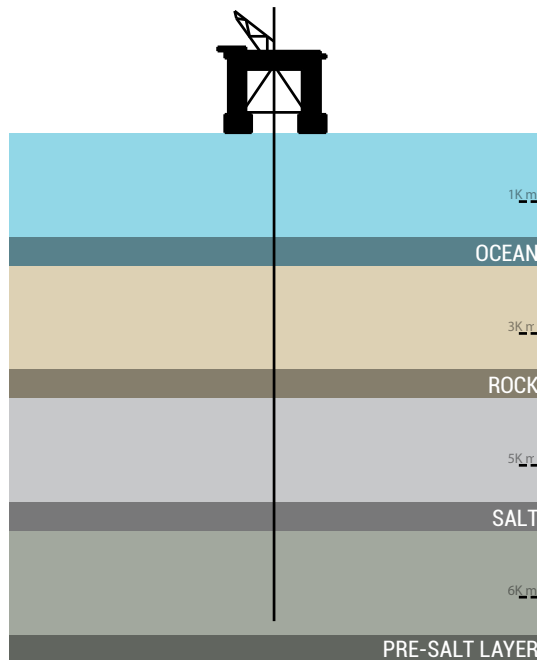
Image of a Horizontal Well north of Williston ND.
Photo by Elizabeth Hawks. July 2012.

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THE CURRENT STATE

Due to rising prices in oil, new, more expensive methods of extraction have become viable. Global markets and a continued dependence on oil have brought a desire for more drilling and extraction from within the United States. The availability for extraction also brings the potential for more towns to experience a significant economic boom.

Methods of Oil Extraction



Presalt Deepwater

\$ \$45-\$65

50-100 Billion

! A blowout, like the BP spill in the gulf, would be extremely difficult to control as it is deeper than in the gulf.

Arctic Offshore

\$100

90 Million

Oil spills would be very hard to clean with the freezing water and the remote area.

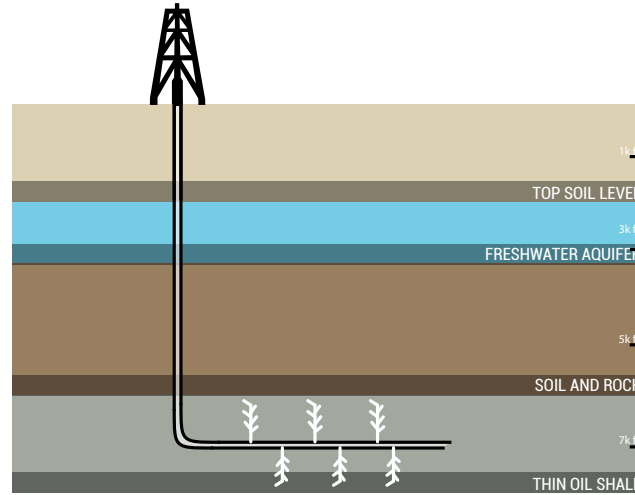
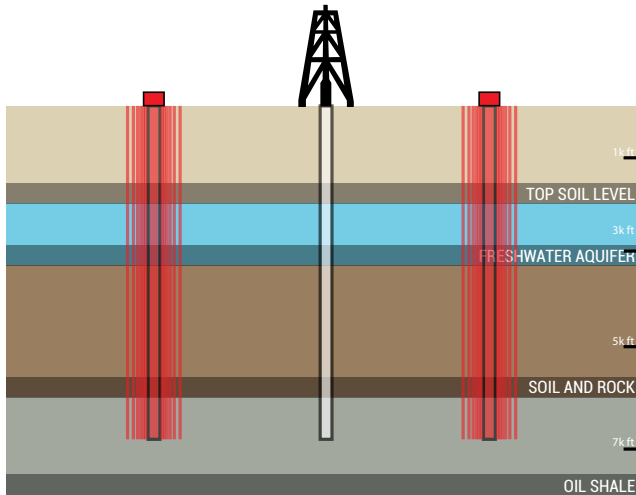
Oil Sands

\$50-\$75

169 Billion

Open pit mines leave large piles of tailings that can pollute nearby water sources. They also emit 10%-50% more greenhouse gas than conventional oil due to additional refining.

[Fig. 05] [Information from: Bryan Walsh. "The Future of Oil." Time 9 Apr. 2012: 28-35.]



Each new method of extraction utilized by oil companies provides new opportunities for developmental growth patterns. In the past, oil sources were unpredictable in how long they would be productive. With modern technology, geologists and engineers are able to more accurately determine the amount of available crude resource is within the earth's various layers. While the more traditional wells can be productive for more than 50 years, current technologies gather oil and natural gas from thinner layers of rock.¹ This pattern means wells are more mobile than traditional wells and only produce for around 30 days each, clearing an area of the basin in 5-15 years. Basin areas are large and local communities experience a healthy economic boom, however, the boom is not lasting and communities must prepare for when the resource is no longer a major source of their economy.

Oil Shale

>\$100

800 Billion (uncertain estimates)

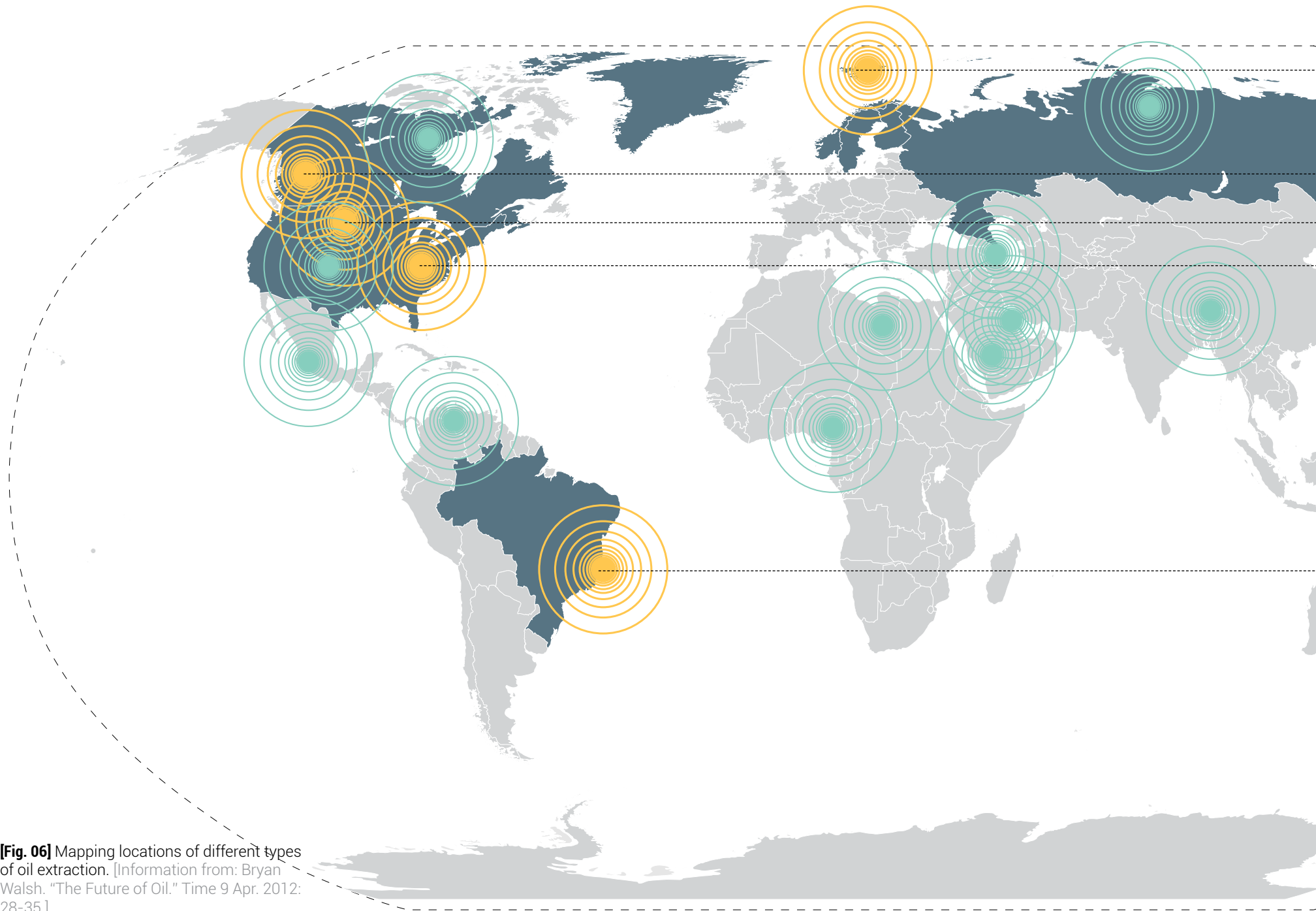
Produces toxic tailings. Uses a lot of water and land to produce and leaves a larger greenhouse gas footprint

Tight Oil

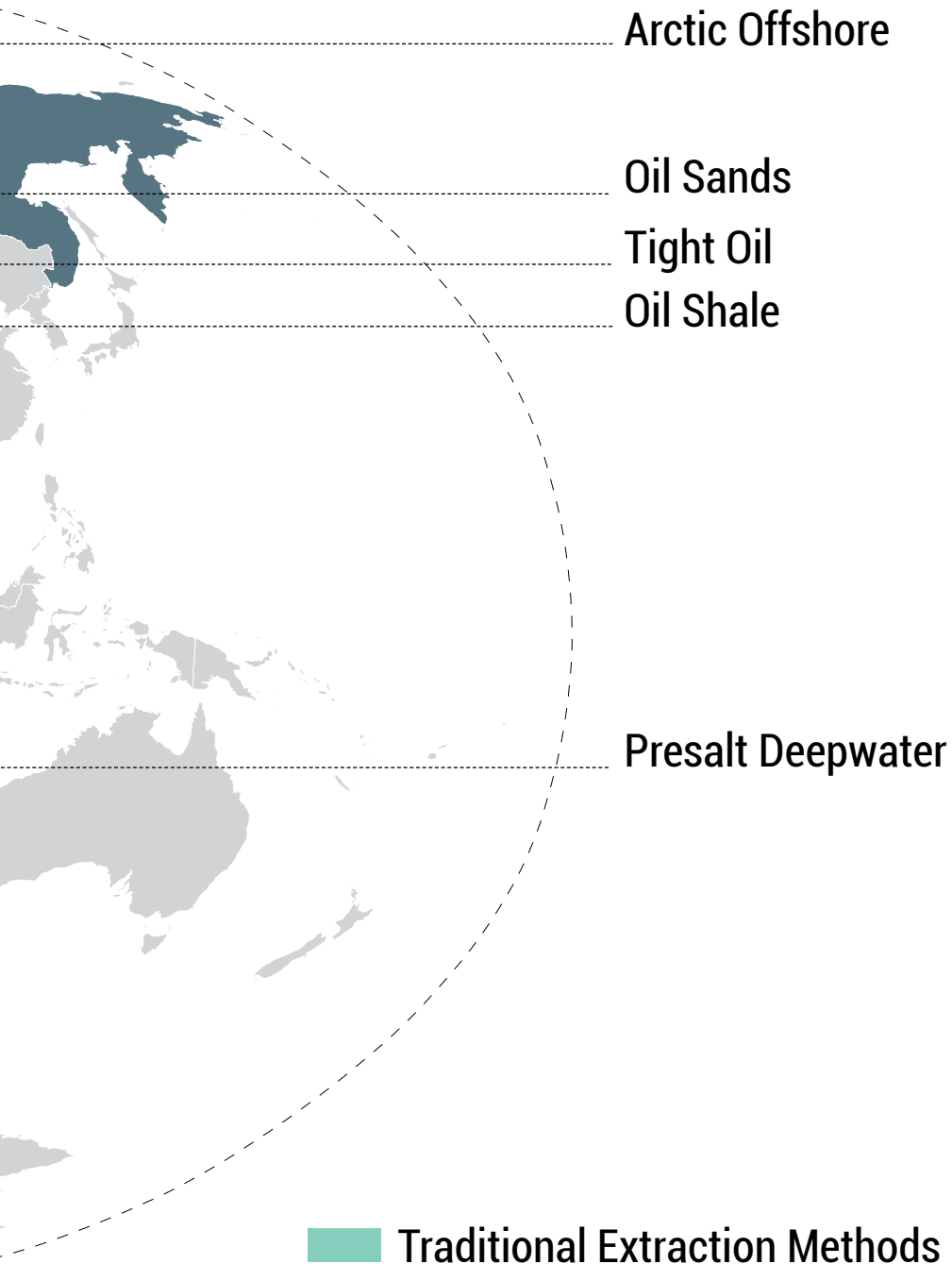
\$50

300 Billion

The process injects millions of gallons of water and chemicals into the ground. The risks are: contamination, excess methane air pollution and surface spills



[Fig. 06] Mapping locations of different types of oil extraction. [Information from: Bryan Walsh. "The Future of Oil." Time 9 Apr. 2012: 28-35.]



Global Oil Locations

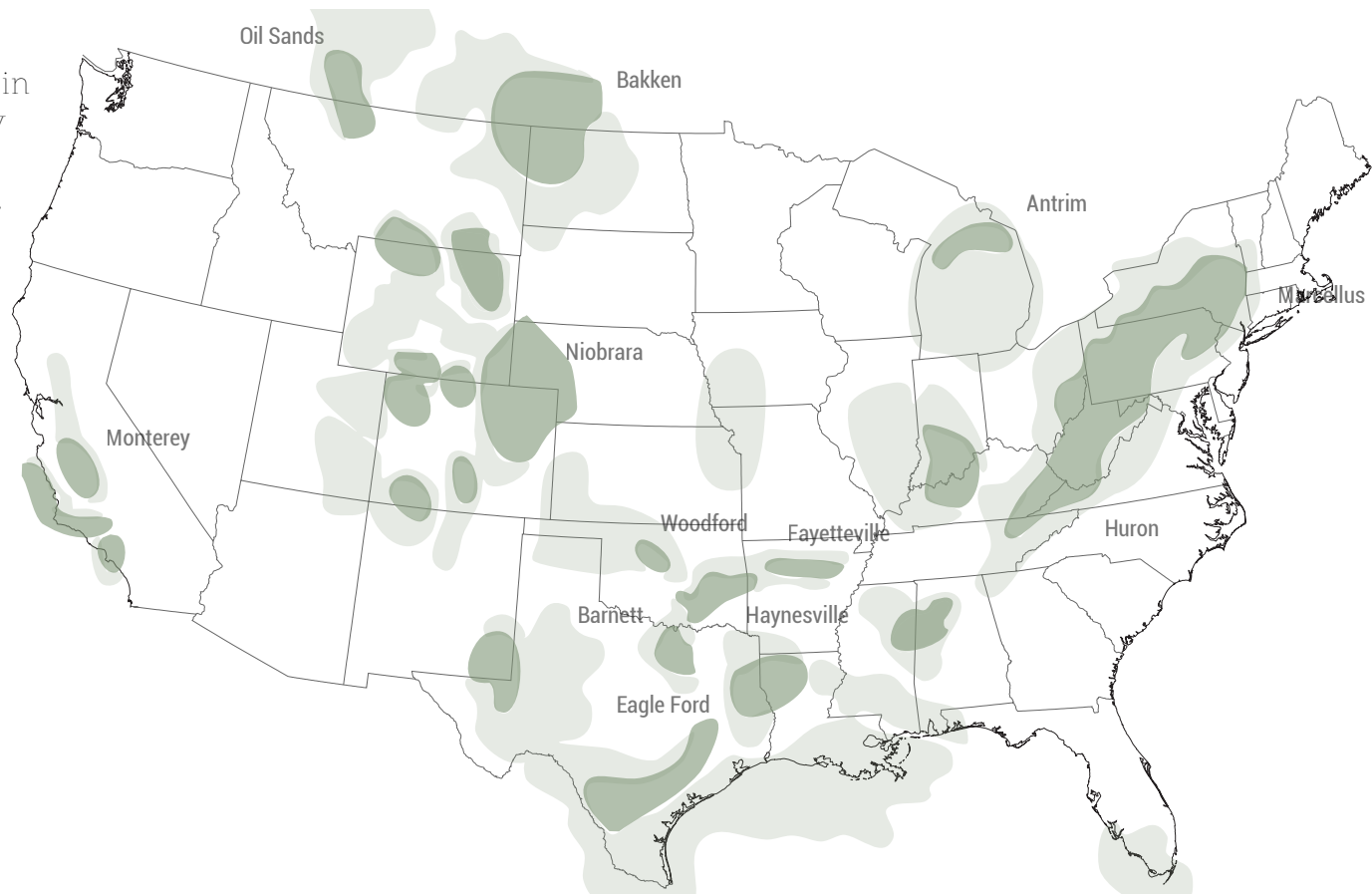
Currently, in the U.S., tight oil basins are the source of the economic boom. Oil and natural gas is extracted via hydraulic fracturing or “fracking”. While it is a controversial method due to environmental concerns, in some areas of the country, the operation is running at full steam.

companies must operate within their own created communities that need to brave some of the most extreme conditions in the world. Due to the lack of existing communities, the industry must also provide for communities which can be disassembled and removed when the operation is finished in the future.

As oil in previously drilled locations begins to deplete, the new methods of extraction begin to provide drilling opportunities to new countries and areas around the world. Russia, Venezuela and the Middle East have been the main suppliers of the world’s crude oil since its discovery.¹ The possibility of large oil deposits in new areas of the world means there will also be a large surge of workers and job opportunities in these areas as well. Wells are also beginning to arise in unpopulated areas of the world, such as off shore and arctic drilling. In these instances, workers and

U.S. Shale Oil Basins

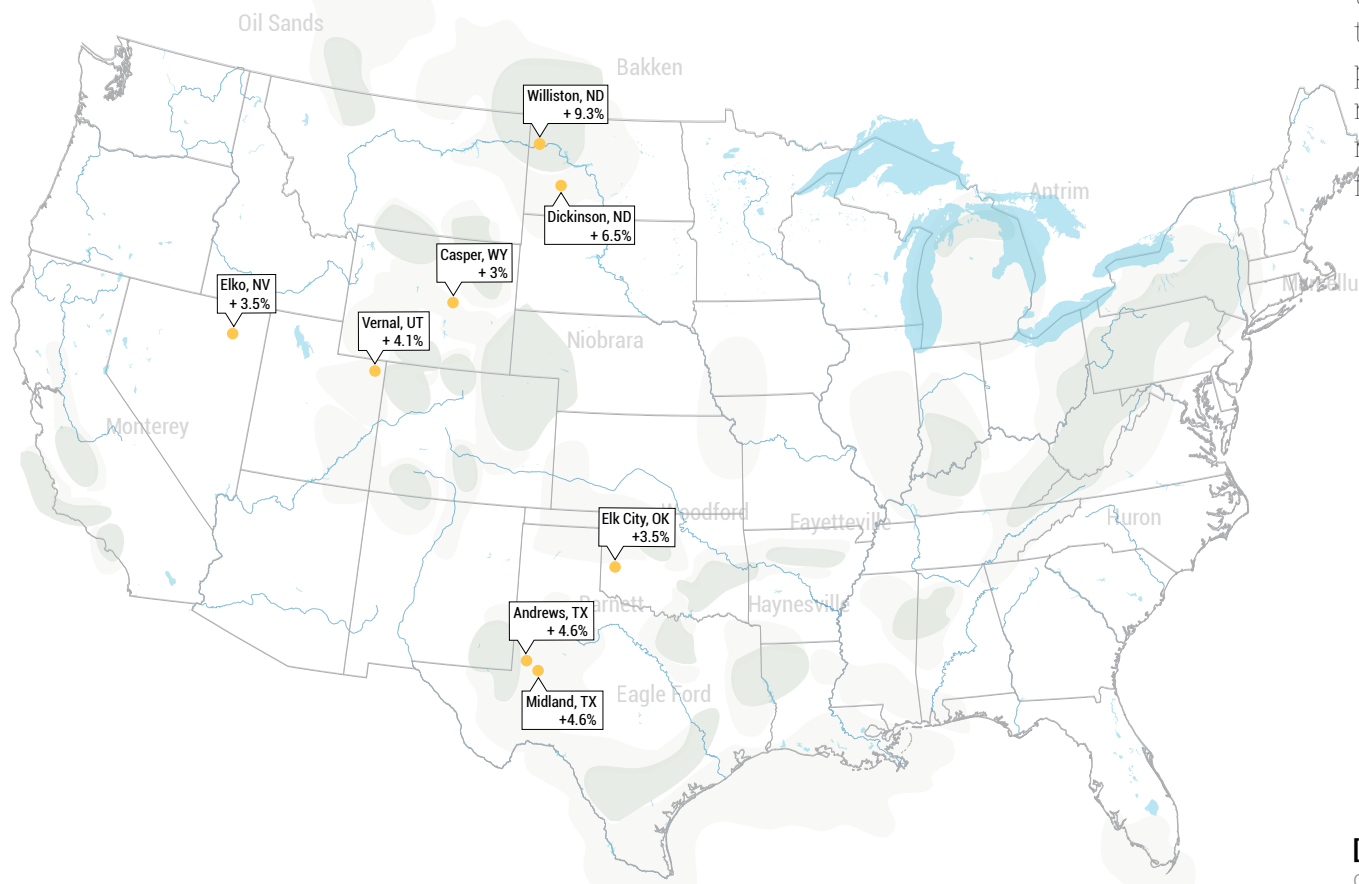
The current locations for tight oil are located within the estimate shale basins. While estimates are not 100% accurate until the drilling begins, geologists estimate a total of 300 billion barrels of extractable oil is located within the U.S. basins alone. This would make the U.S. the top producer of oil in the world. The basins currently being explored are the Bakken in North Dakota and Montana, as well as basins in Texas and Oklahoma. The amount of exploration in these areas is most likely due to the fewer regulations on drilling in these areas.



[Fig. 07] Oil Shale Basin locations in the U.S. [<http://www.eia.gov/analysis/studies/usshailegas/>]

Growth of U.S. Boomtowns in 2011

The map shows the amount of growth in each of these towns in the span of only 1 year. The growth of each of these towns is due to oil production in these areas and the towns continue to boom greatly from this new found economy. The towns are all familiar with oil production; however, the new method of fracking has created a re-entry for these areas into the field.



[Fig. 08] U.S. Boom Cities map [<http://money.cnn.com/pf/america-boomtown/>]

1. Walsh, Bryan. "The Future of Oil." Time 9 Apr. 2012: 28-35.

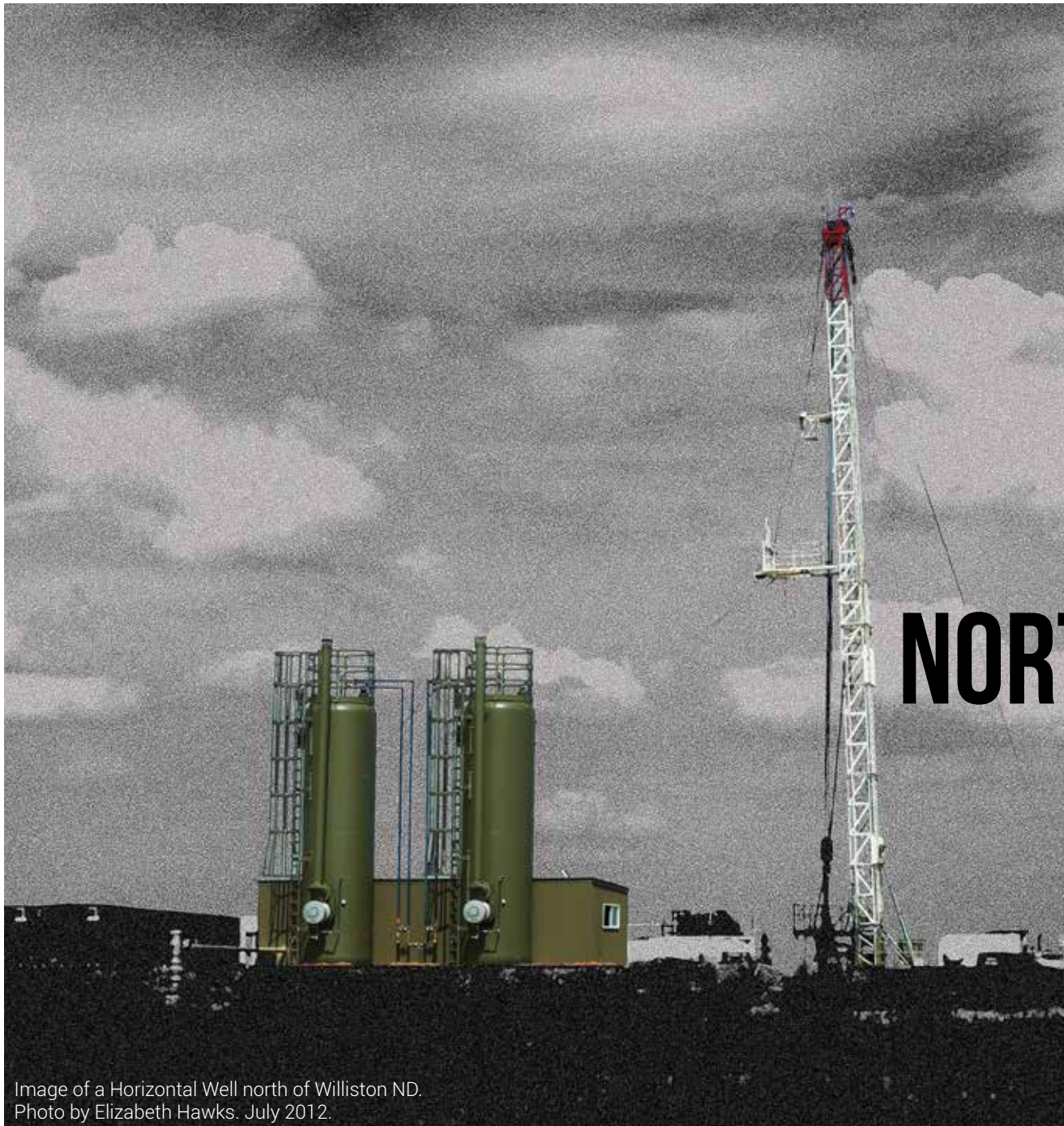


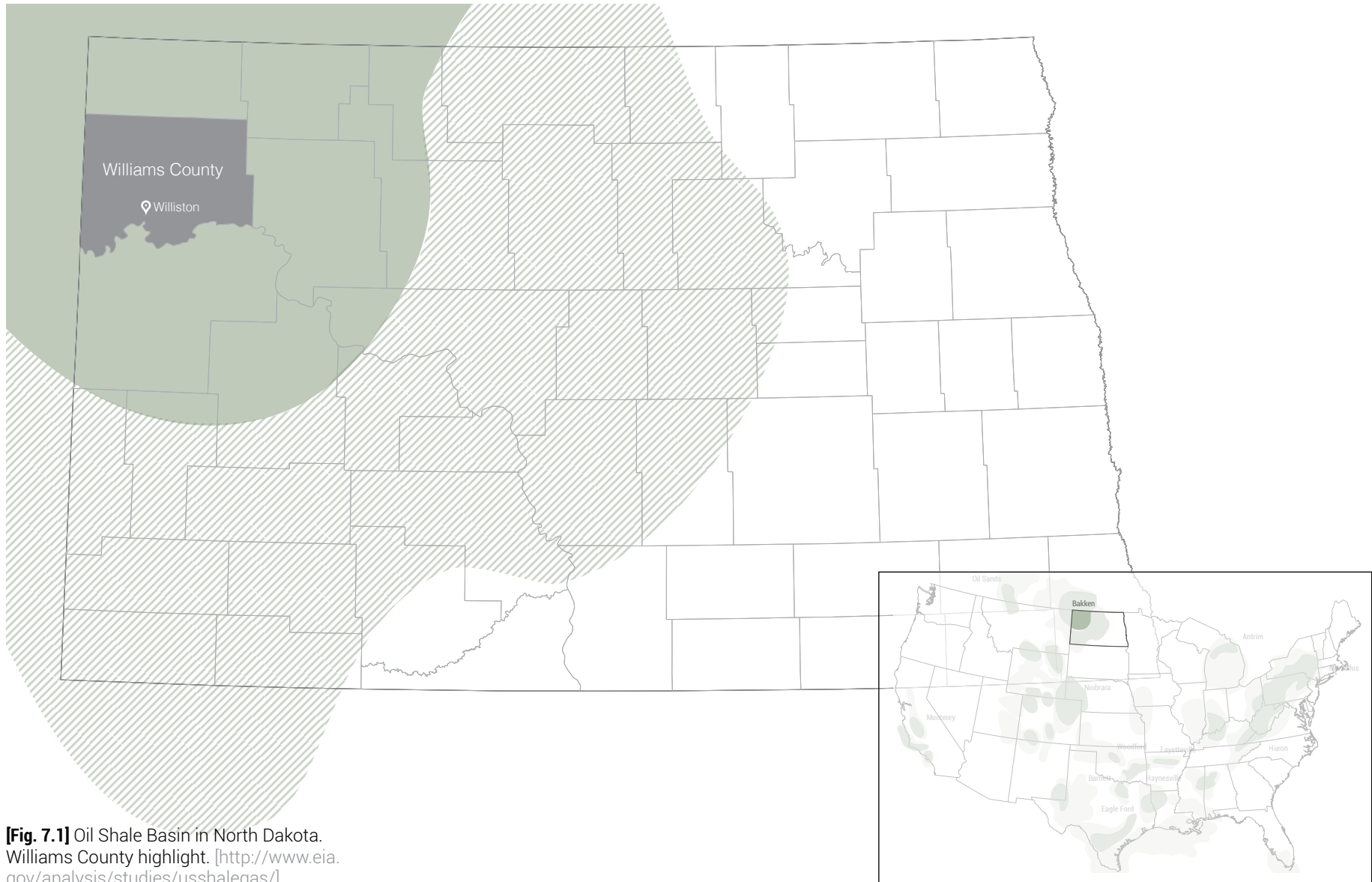
Image of a Horizontal Well north of Williston ND.
Photo by Elizabeth Hawks. July 2012.

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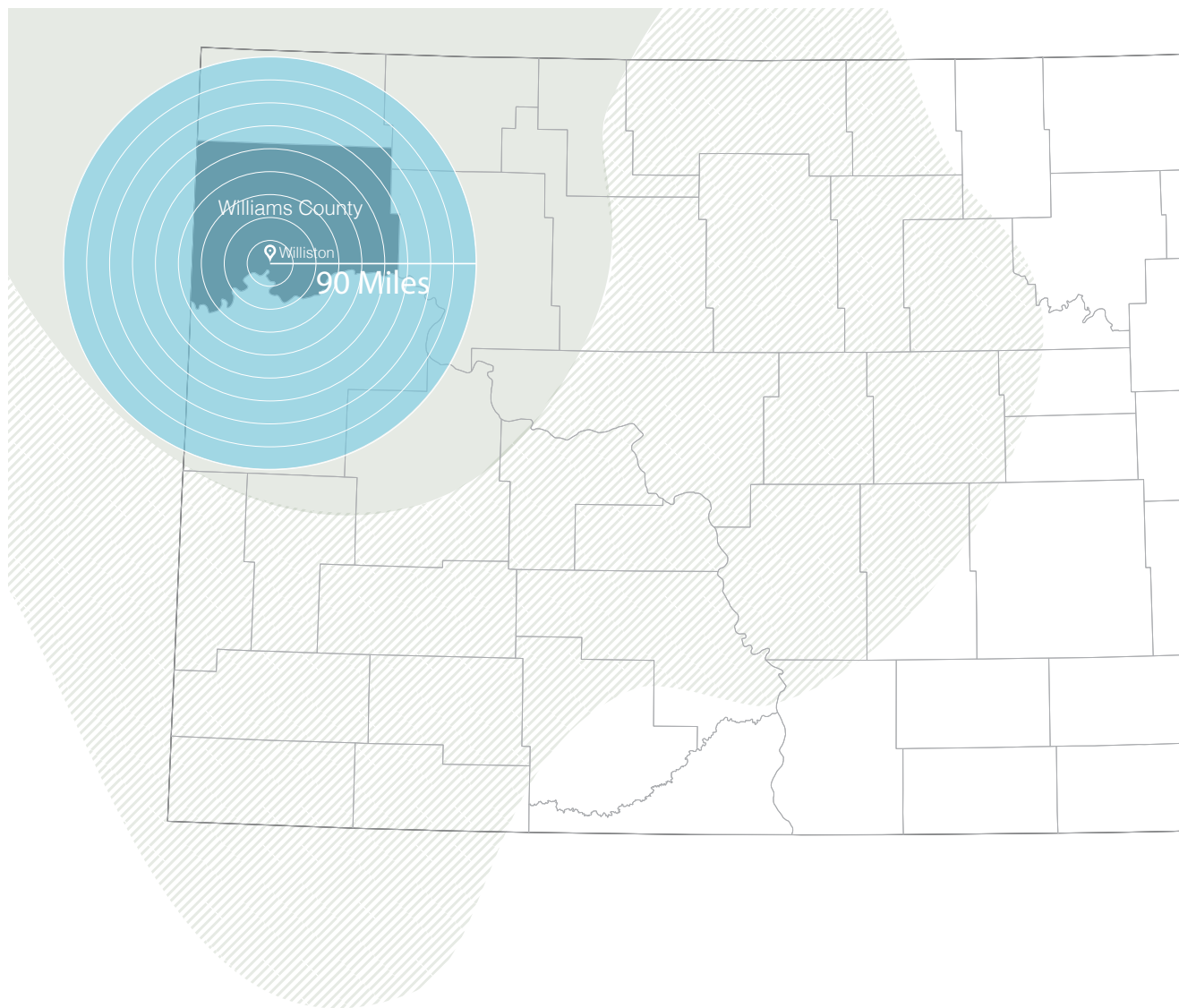
NORTH DAKOTA

North Dakota is currently ranked #1 in employment rates due to its booming oil industry. Small towns in the shale area are experiencing extraordinary growth as well as the issues that coincide with said growth.

North Dakota Bakken Basin and Oil Shale



[Fig. 7.1] Oil Shale Basin in North Dakota.
Williams County highlight. [<http://www.eia.gov/analysis/studies/usshalegas/>]



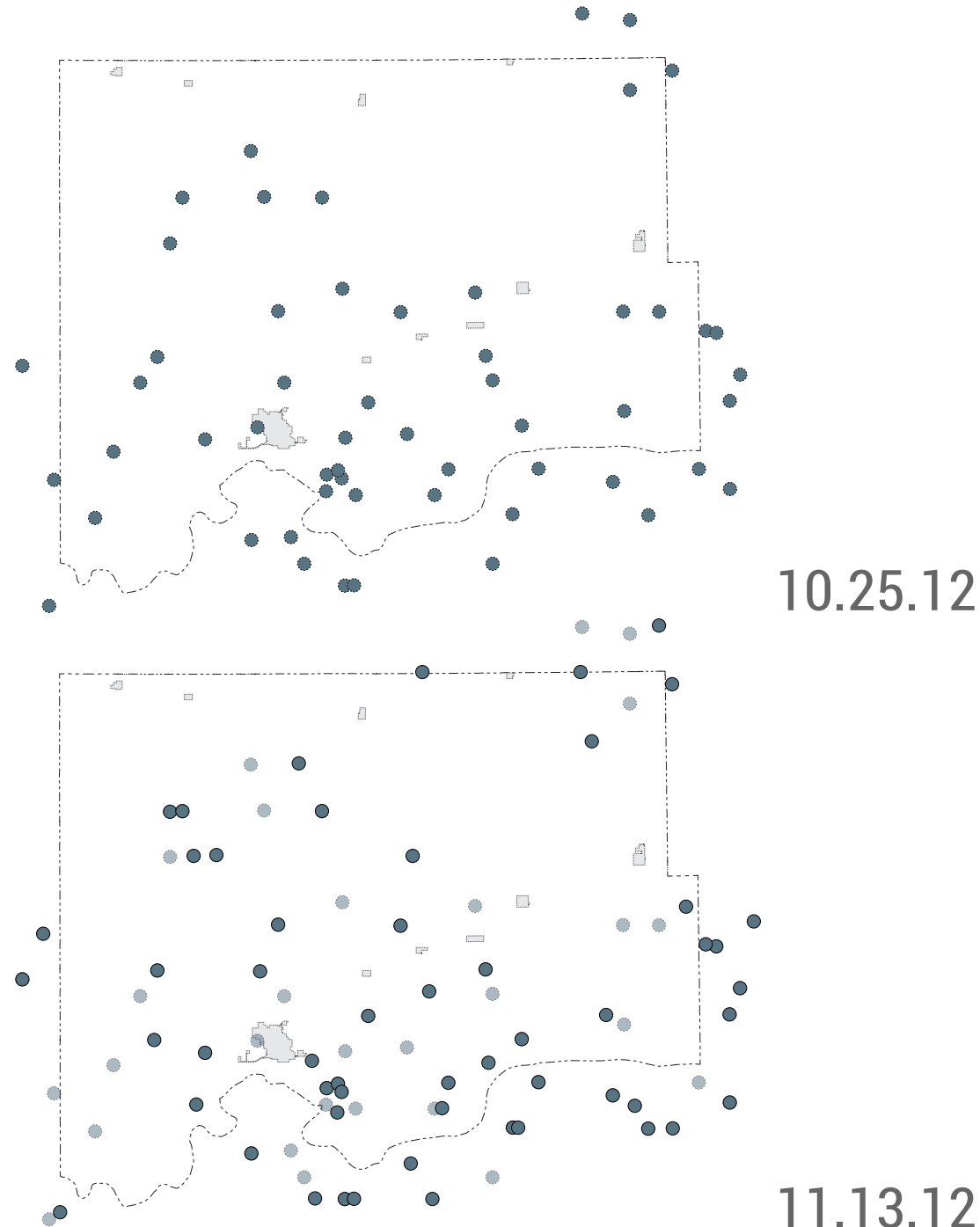
Williston, North Dakota is currently the site of the most profitable oil boom in the United States. Located within the Bakken Basin, Williston is central to the oil production in the state. It is the largest city in the North West portion of the state and the only city within 90 miles with a population of more than 2000 Residents. The 2010 census counted a population of 14, 716 residents, a number that has continued to rapidly increase with the continuation of oil production. Due to its size and relative seclusion, Williston has garnered a massive economic burst in the past few years. Oil companies and workers have used the town as a base for the activity in that portion of the state as well as a center for social and recreational activity for off-duty workers.

[Fig. 7.2] Oil Shale Basin in North Dakota. Williams County highlight. [<http://www.eia.gov/analysis/studies/usshalegas/>]

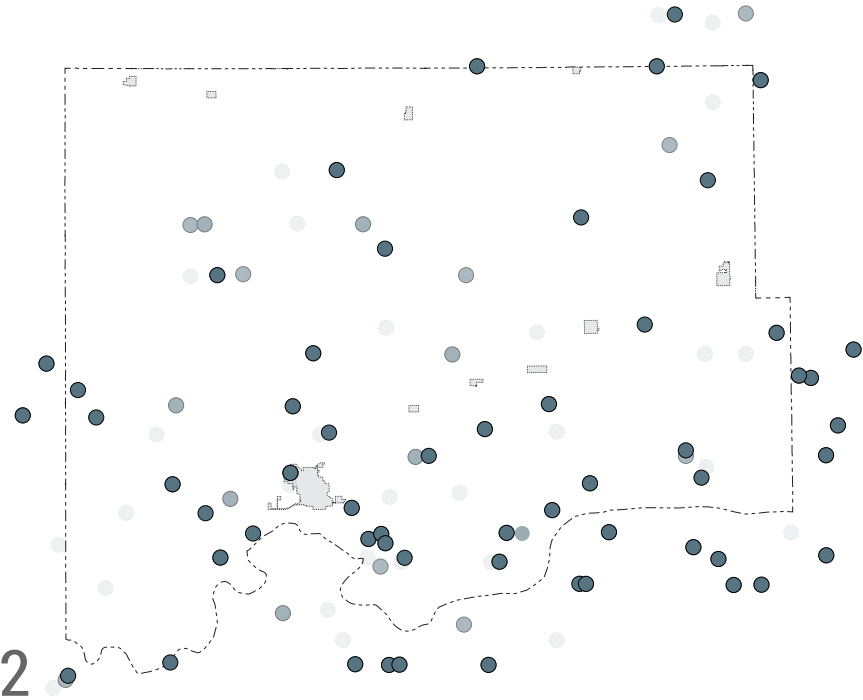
Horizontal Well Locations

Horizontal wells are the type of wells that perform hydraulic fracturing to release oil from the earth. The nature of the oil and natural gas in this process is different than that of more traditional vertical wells. The oil or natural gas is contained within thin rock layers, meaning a well will extract all of the rock fairly quickly. On average, wells will produce in one area for about 30 days before being moved to a new location. The maps show well locations in Williams County over time. The well locations move every month and as seen in the most recent map from July, 2013, the amount of wells in the county has been decreasing. Wells are scattered throughout the county, and are also found within Williston city limits at times. While the wells are scattered, the map of “man camps” shows the favorable location to be near established towns.

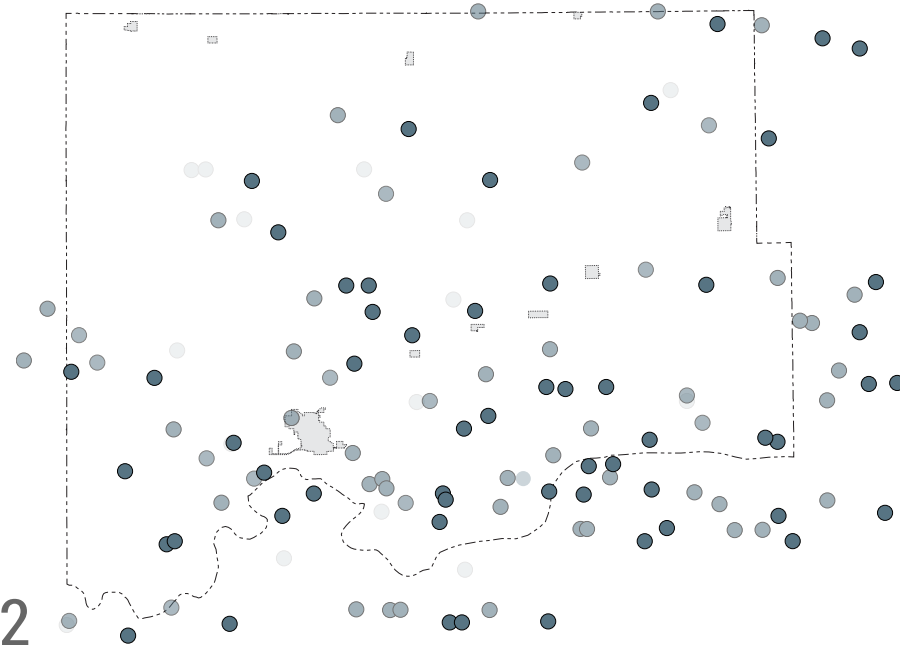
[Fig. 08] Williams County maps obtained from www.williamsnd.com

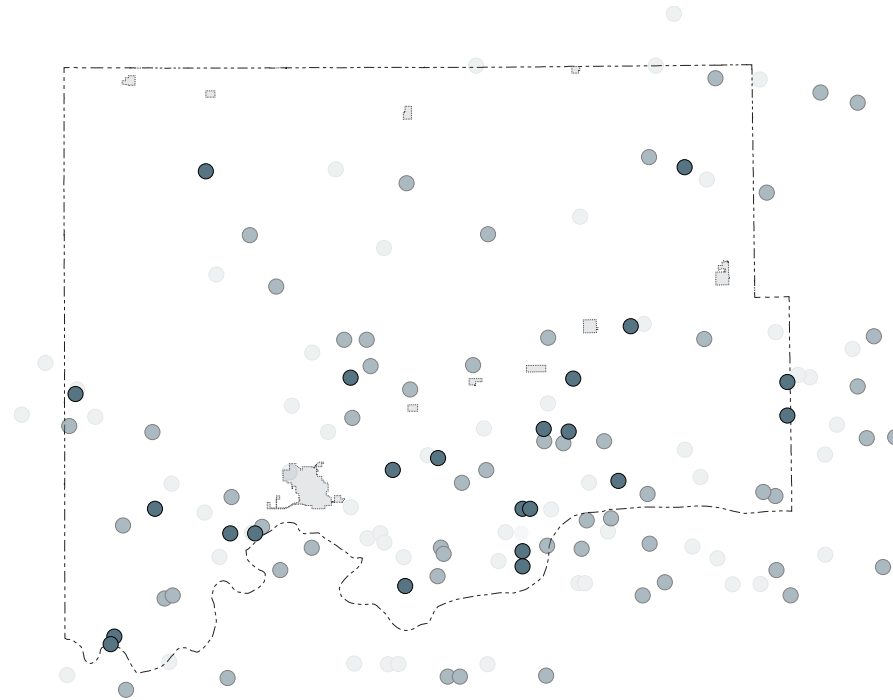


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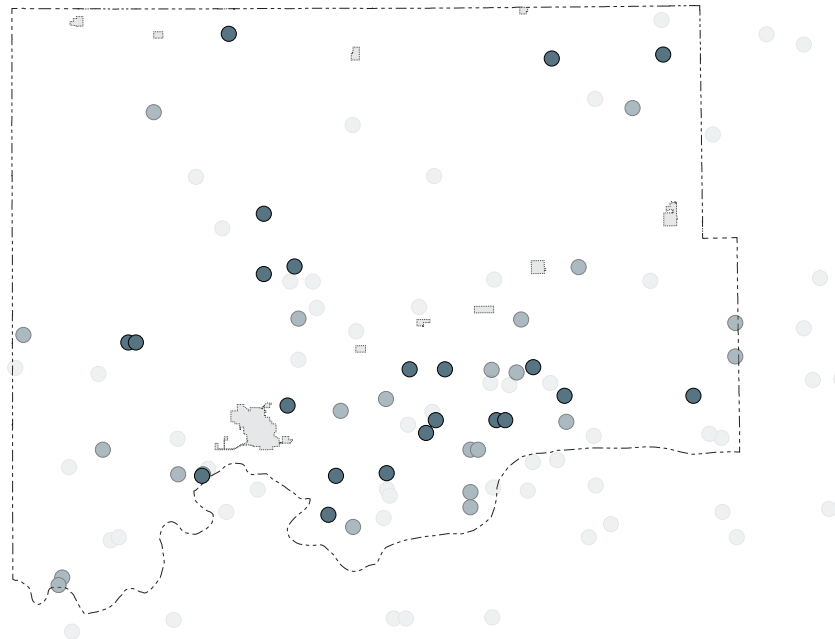


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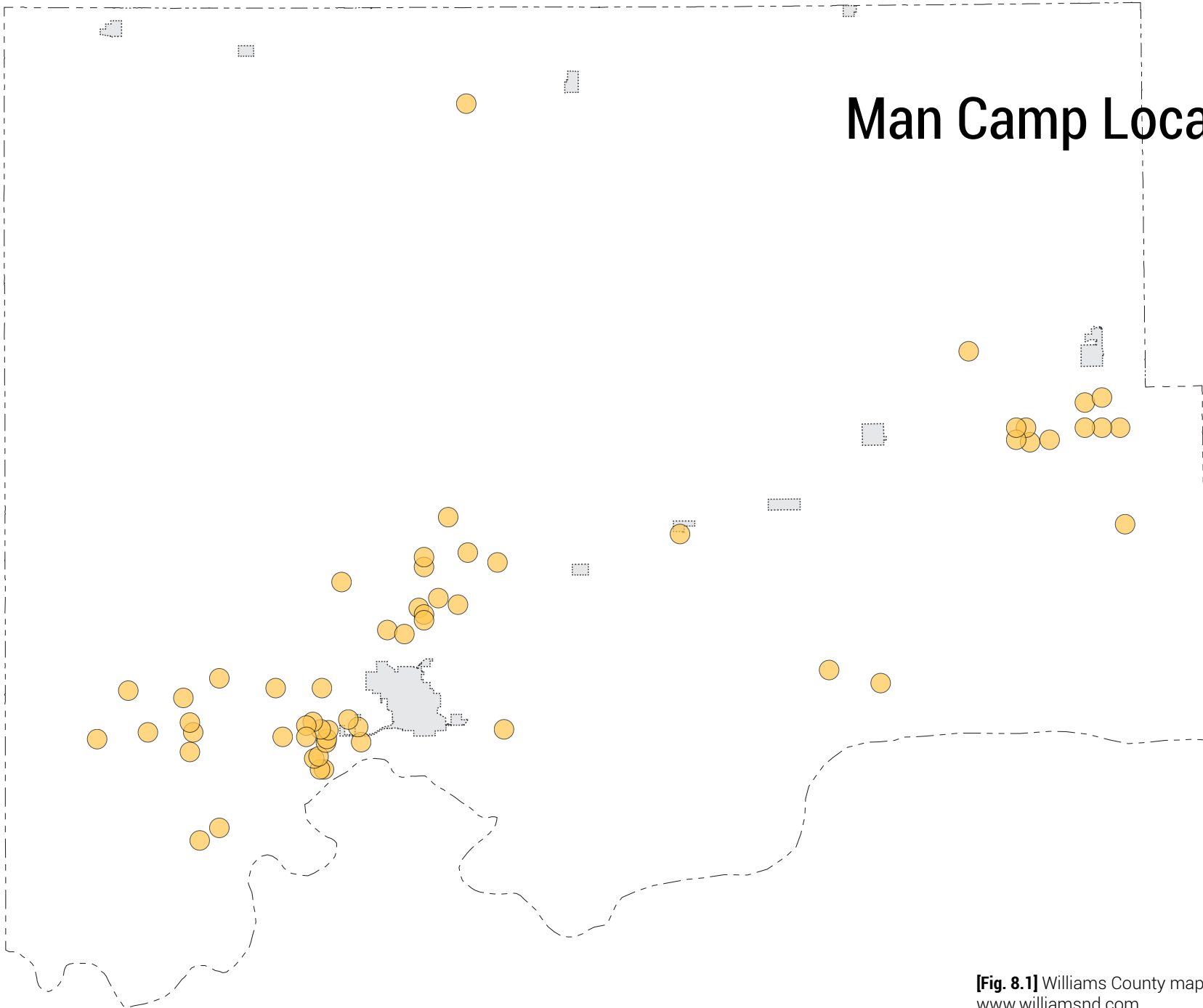


3.27.13



7.19.13

Man Camp Locations



[Fig. 8.1] Williams County maps obtained from www.williamsnd.com

Williston, North Dakota

2010 Population: 14,788

2012 Population [estimate]: 18,532

Population Change [4/1/12-7/1/12]: +25.3%

Population under 5: 7.5%

Population under 18: 23.6%

Population 65+: 14.4%

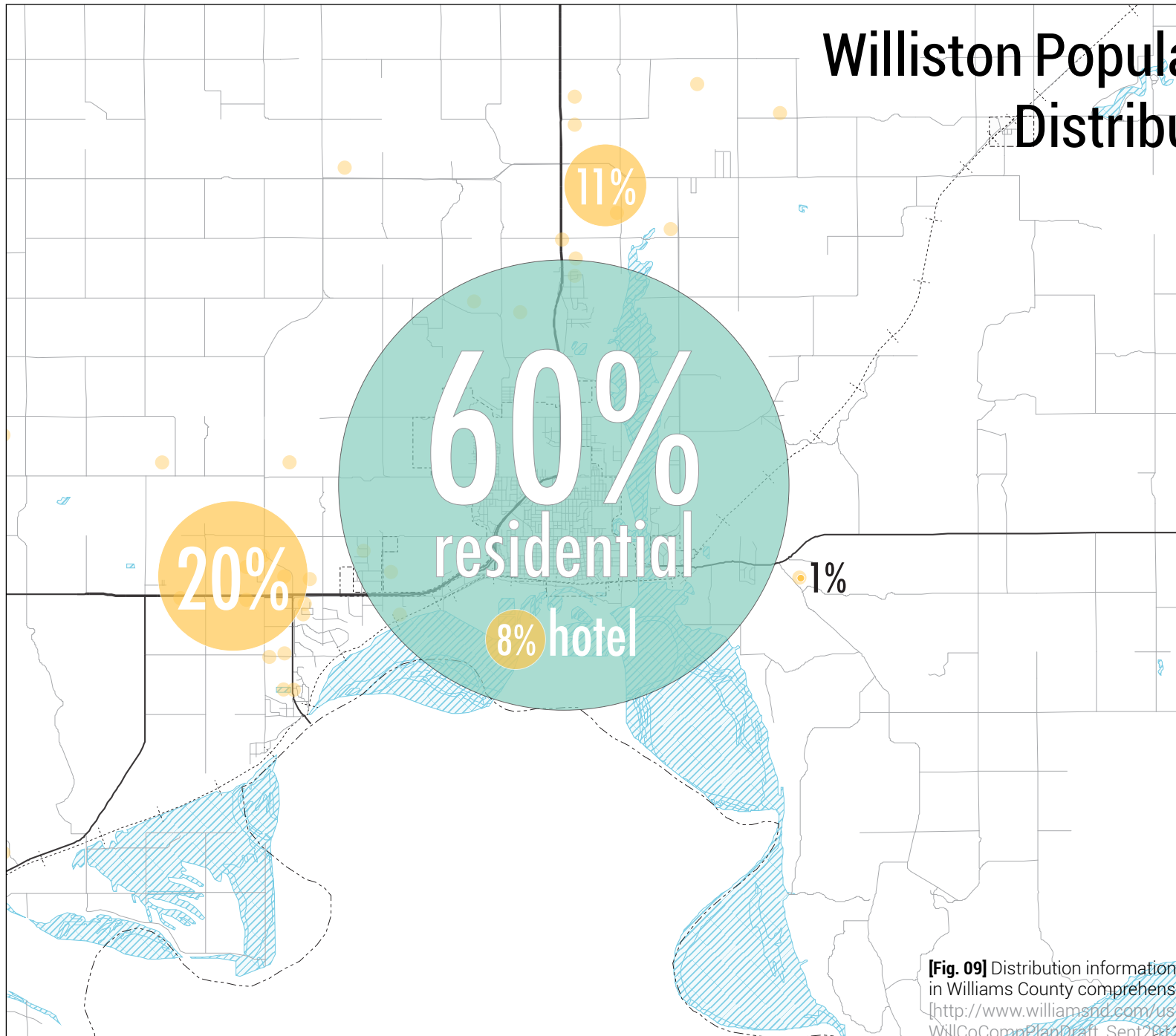
Land Area: 7.5 sq. miles

Persons per sq. mile: 1,961

[www.quickfacts.census.gov/qfd/states/38/3886220.html]



Williston Population Distribution



[Fig. 09] Distribution information found in Williams County comprehensive plan http://www.williamsnd.com/us/files/WillCoCompPlanDraft_Sept2013_Part1b.pdf

Oil Boom Population Growth

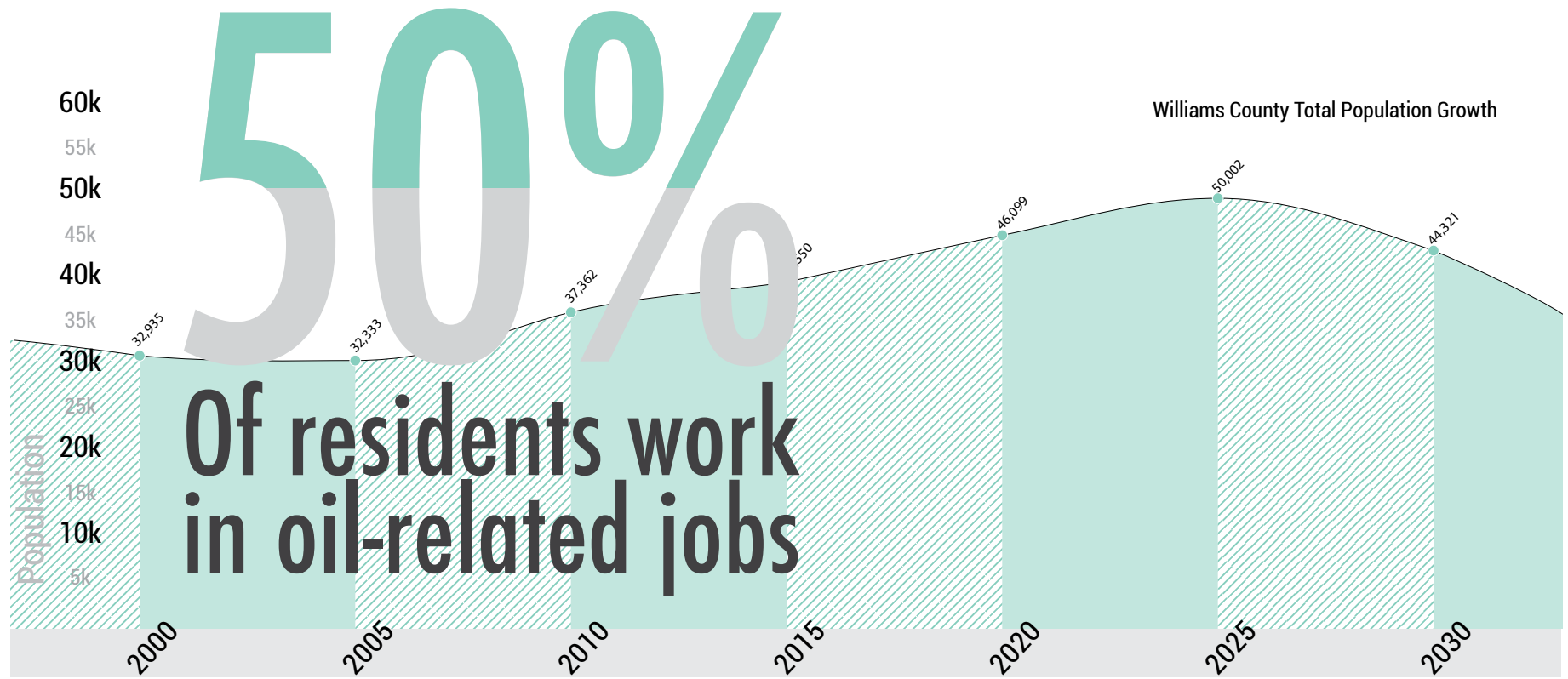


Fig. 10.0

Williams County, North Dakota, central to the activity within the Bakken Basin will experience one of the highest rates of growth during this period of oil boom. The period of growth is expected to peak in 2025, when the shale oil in that area is thought to be depleted

and oil workers will have moved to different areas of the basin or to a new basin entirely. Population for Williams county during this time is estimated to almost double by 2025 with a population of over 50,000 people. The population of Williams county is estimated to

be made up of 60% permanent residents. The rest of the population is made up of more transient residents in rental properties, hotels, mobile homes or man camps. Williston is the largest city within the county with a population that makes up more than 60% of the county.

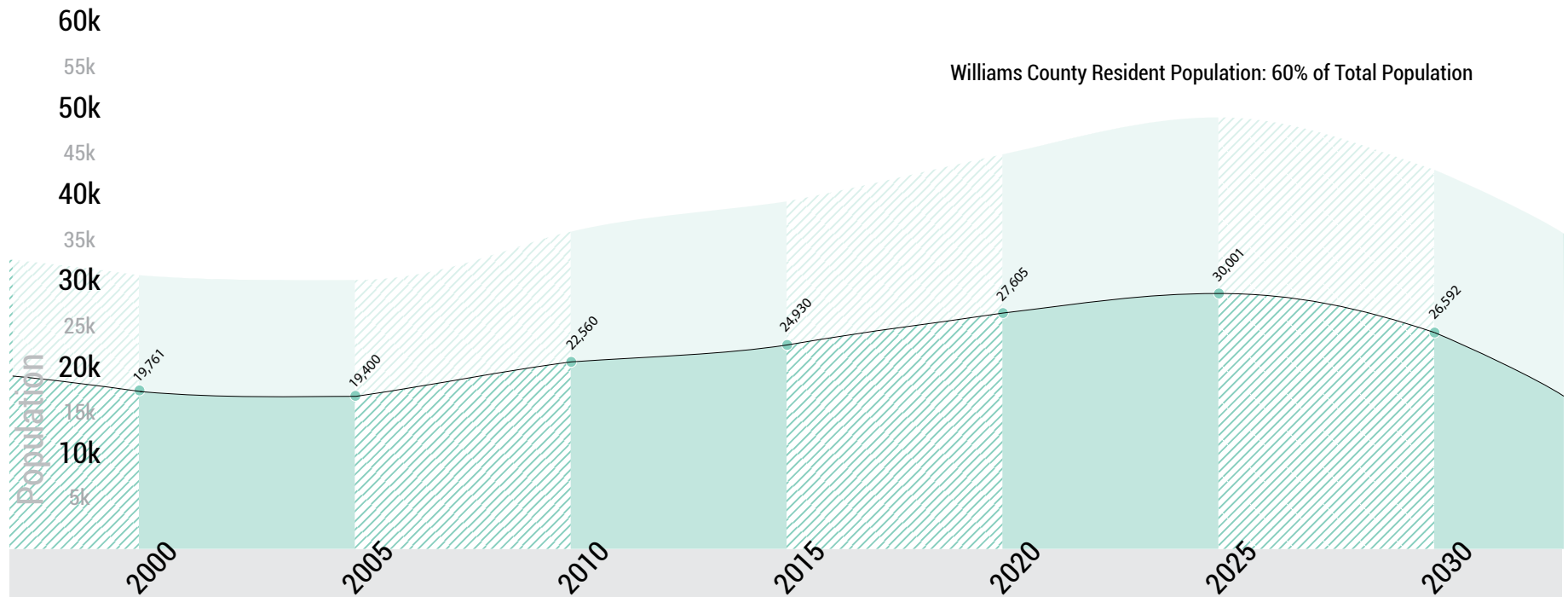


Fig. 10.1

Williston alone will have experienced a growth of more than 8,000 permanent residents in 20 years. Within the 2030 county comprehensive plan, planners and policy-makers have stated their concern for the decline in population. Having gone through a short-

lived boom period in the 1980's, the town knows what it is like to build rapidly only to be left with unfinished streets and abandoned homes. Keeping in mind the inevitable decline in population after the peak of oil production, planners will accommodate an estimated

70% of the growth population within their plans. This way, the town can manage the eventual decline and prevent decaying and abandoned zones from within the city. Areas which can no longer be occupied often cause problems within a city such as a lack of community

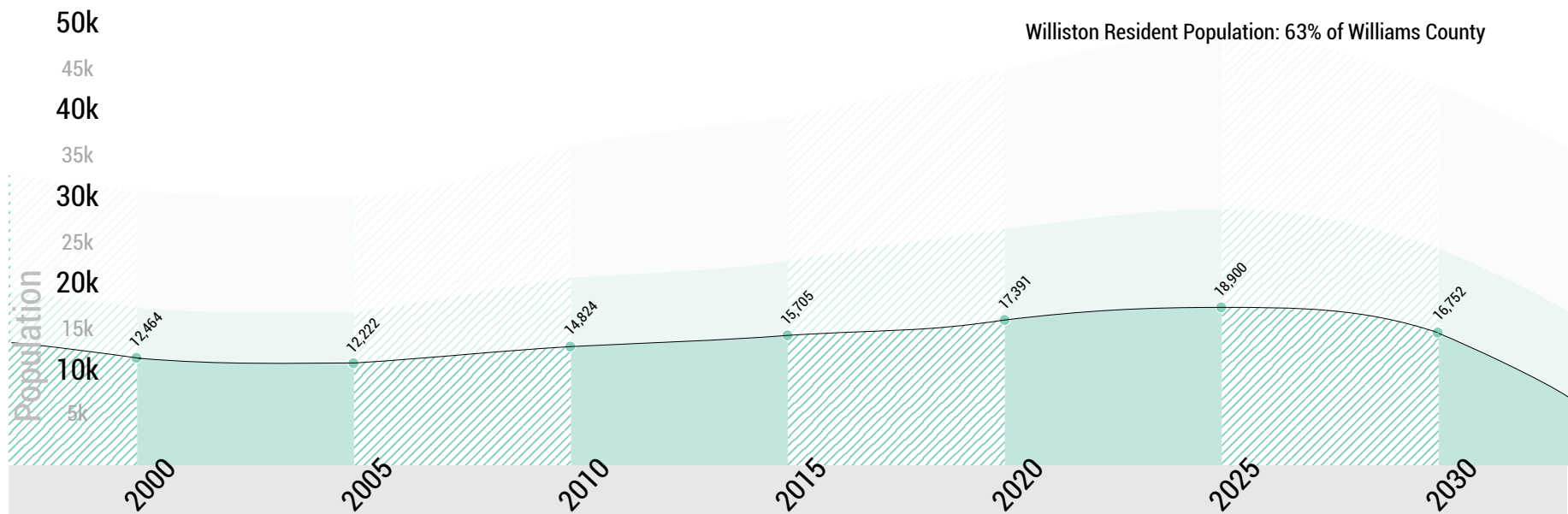


Fig. 10.2

and an increase in crime. As for the remaining population, it is assumed that they will either live in temporary shelters such as RVs or Man Camps. Otherwise, workers will have to commute from cities outside of the county for work. This is not an uncommon practice as the

work schedule for oil rigs are often 2 weeks on and 2 weeks off duty. This way, men can work while living in camps and return home to families, who are usually unable to live in Williston due to inflated prices, for their time off.

The situation many

workers and residents find themselves in because of this rapid growth period is not ideal. For this reason, my design intervention will be to accommodate the part of the population that is not accounted for in the permanent city plan. The design will create a

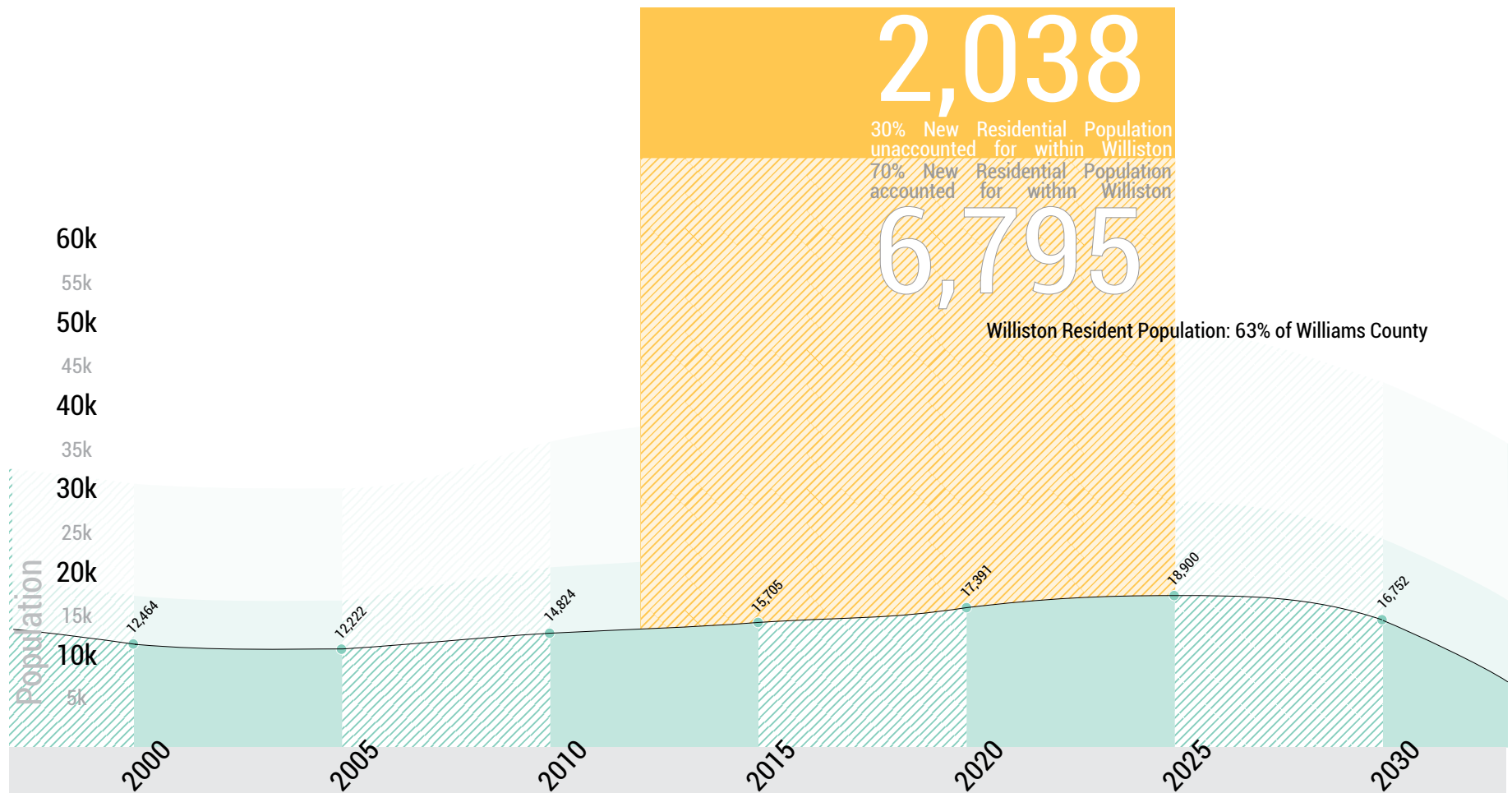


Fig. 10.3

community for the amount of transient population that would otherwise find housing outside of Williston or in temporary shelters. The community will accommodate the 30% of new growth that is left out of the comprehensive plan, which is estimated to be over 2000

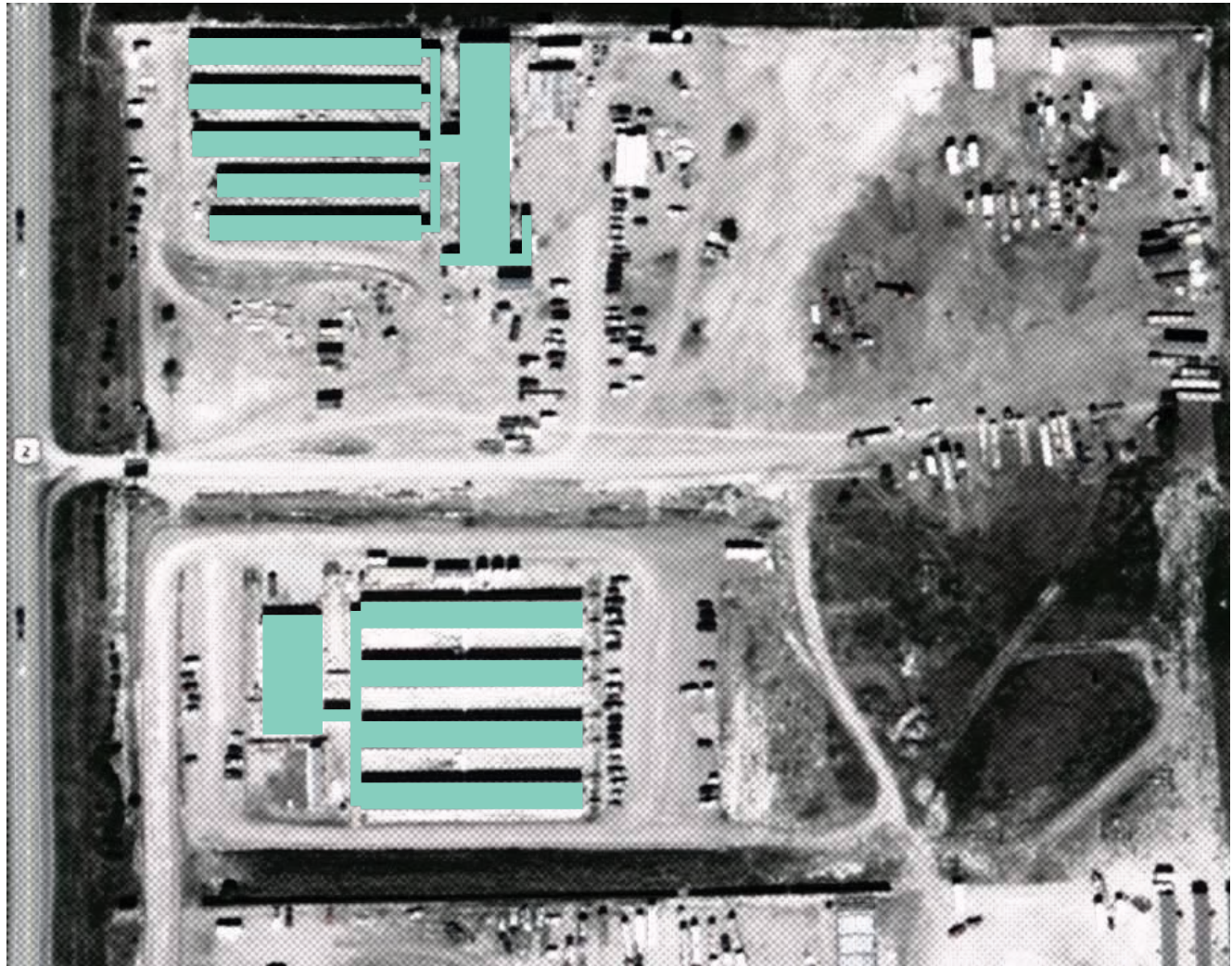
residents. The new community will provide an alternative housing arrangement to what many workers and families currently find for themselves.

[Fig. 10.0-10.3] County growth information found in Williams County comprehensive plan [http://www.williamsnd.com/usrfiles/WillCoCompPlanDraft_Sept2012_Part1b.pdf]

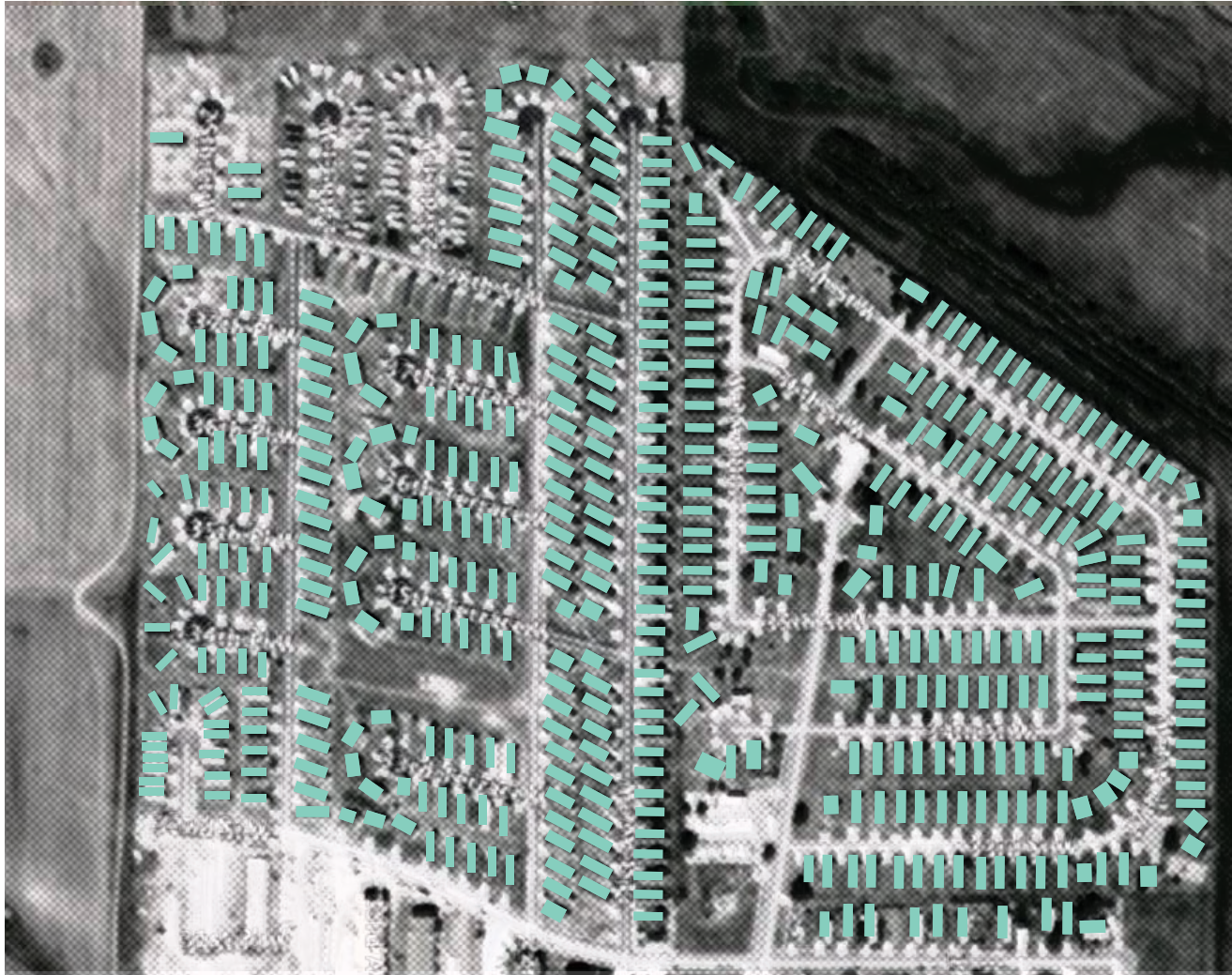
The “Man Camp”

In order to house the flood of oil workers in the area, oil companies provide dormitory-style bunkhouses, which provide for the daily needs of single male workers in the oil fields. This is convenient for workers to be close to the work field and be able to live in affordable rooms as well as for oil companies, who can hire workers from across the United States to stay in these communities. The structures are temporary and can be built on site while oil is being extracted, then torn down when the work is gone. Camps often provide amenities such as rec. rooms, gyms, and full service dining halls.¹

The camps have been dubbed “Man Camps” due to the fact that families and women are not allowed to live in these areas and often need special permission to visit, if they are able to visit at all. The strict rules are for the safety of the women and families, as these camps are often known to be prone to crime and hostility. To try and alleviate



Wing Man Camp
[www.maps.google.com]



Mobile Homes
[www.maps.google.com]

crime, these communities are also usually very strict about use of alcohol, weapons, and drugs. There are limited rooms within the man camps, and men who have the opportunity to live there are expected to follow the rules or they are asked to leave.²

The most popular type of camp found in North Dakota is a wing-type structure. The dorm wings are usually one-story and connected to a public wing which houses the social spaces such as the laundry or dining hall. It is not uncommon to see multiple groups of man camps set up in a row along a main highway within the oil basin. On average, the camps house around 500 men, but larger camps have been able to house up to 1500 men. A Halliburton owned man camp is one of the larger camps in the area surrounding Williston. It is a 3-story camp with a larger central room, which makes up the social spaces.

Due to many of the strict rules within man camps, or the fact that alcohol, pets, or women and families are not allowed, some workers have set up more informal living groups.¹ These housing communities have more freedom but often lack any of the amenities provided within company owned camps. The informal camps are usually made up of RV Campers or mobile homes and are often set up on unoccupied lots or farmland. These groups are usually also lacking power and water, as the city has to catch up on infrastructure to be able to provide basic utilities to the abundance of these communities.

The camps are often located just outside of city limits in towns near the oil production. While the camps provide basic necessities for workers, there are needs that the workers still need from a town such as groceries, entertainment and recreation. The men bring in a



Multi-Story Man Camp
[www.maps.google.com]



RV Campground
[www.maps.google.com]

lot of economic opportunities for a town. The influx of workers and prospective workers also brings in an influx of crime, degradation and disrepair to a small town that is usually not ready to manage such levels of decline.



[top] Mobile home community outside of Williston, North Dakota. Photo by Elizabeth Hawks. July 2012.

[top right] Three of the many new hotels within Williston, North Dakota built

within the last 5 years. Hotels are home to many workers and family members in Williston who cannot find or afford permanent housing. Photo by Elizabeth Hawks. July 2012.

[bottom right] Temporary post-office boxes set up outside of a local grocer in Williston, North Dakota to provide for the many transient residence with the city during the boom. Photo by Elizabeth Hawks. July 2012.





Hotel Rooms



Mobile Homes



Single "Living Units"



Crowded Housing Units



[left] Photos by Elizabeth Hawks in Williston, ND July 2012.

Impromptu “playground” near oil field

[top] [<http://crudeoilpeak.info/desperate-times-trucking-shale-oil-in-north-dakota>]

Cost of Living

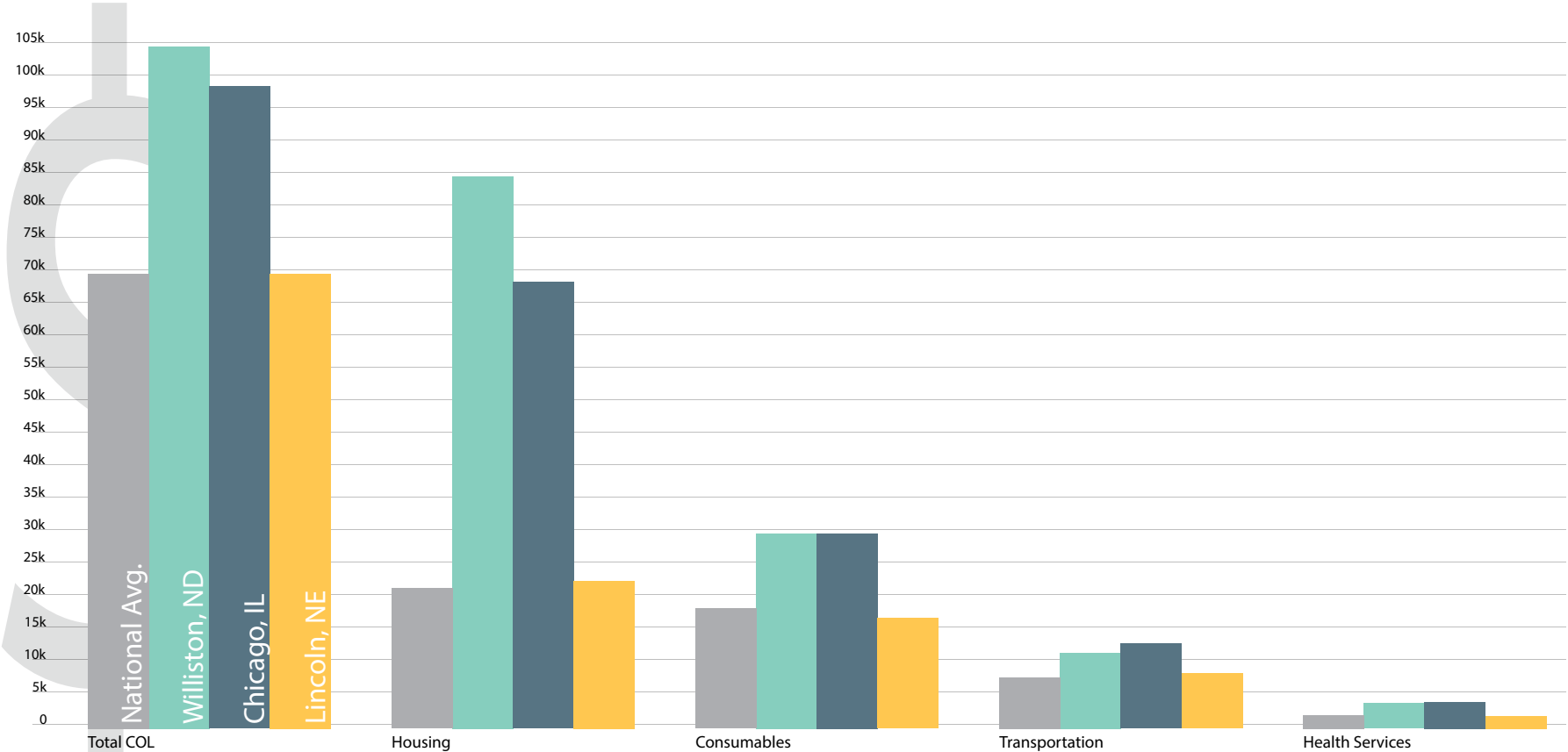
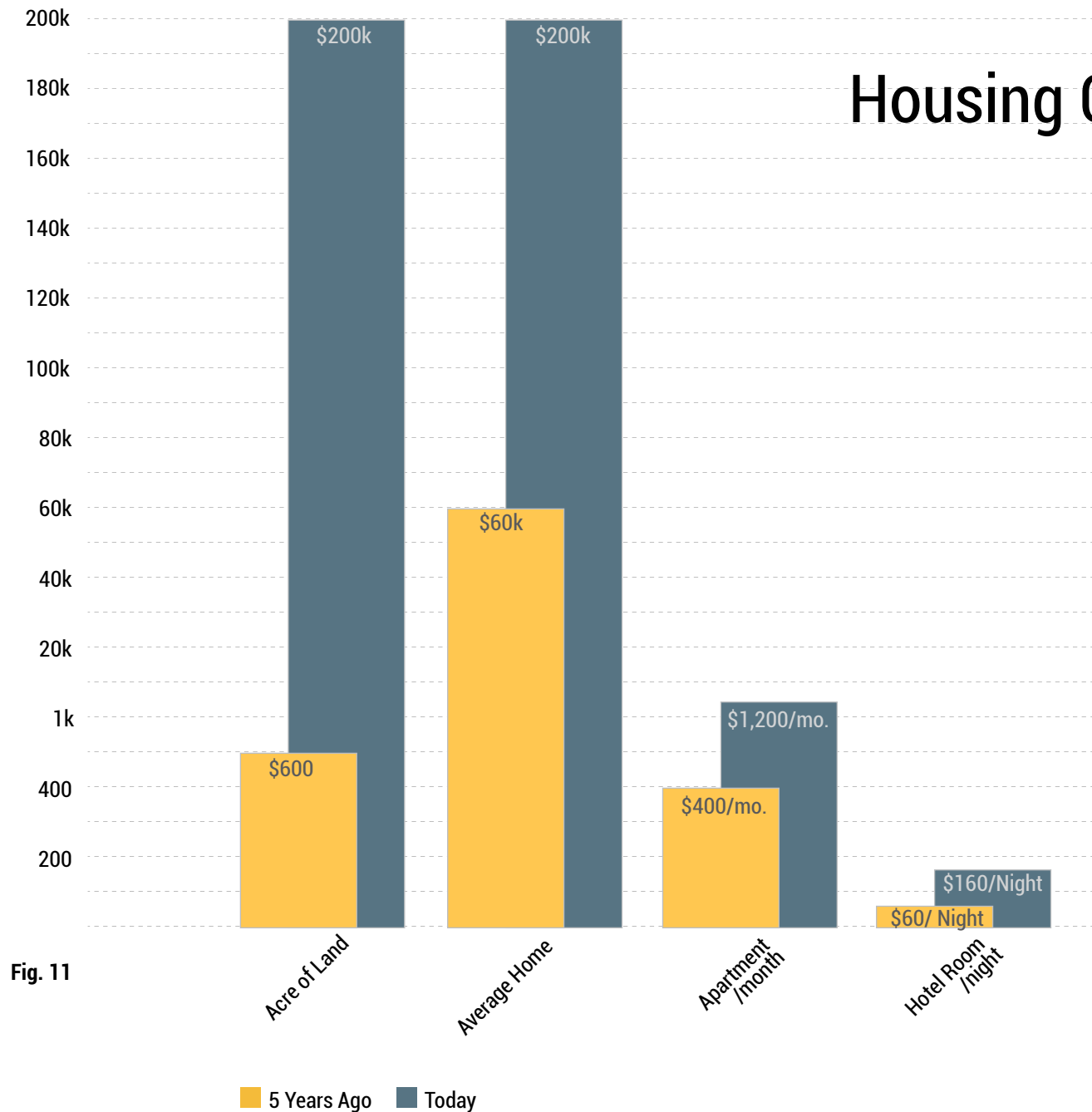


Fig. 12

Housing Cost Comparison

With the rush of people to the abundance of opportunity in the oil field, housing is difficult to come by and resources provided by the surrounding small towns is running low. Prices in this area of the state, normally mostly rural, are greatly inflated. Prices are well above the national average and are closer to those of Chicago, IL. The greatest price inflation is that of housing. Builders are unable to keep up with the amount of people entering the state hoping for work. Housing and land cost comparisons in Williston to only 5 years ago show an extreme cost inflation. The price of an average home or apartment has more than doubled. This makes it difficult for renters to be able to afford their own apartments and for lower to middle income workers to be able to find somewhere to live within their means.



[fig. 10-11] Cost of living and housing.
[\[http://www.city-data.com/city/Williston-North-Dakota.html\]](http://www.city-data.com/city/Williston-North-Dakota.html)

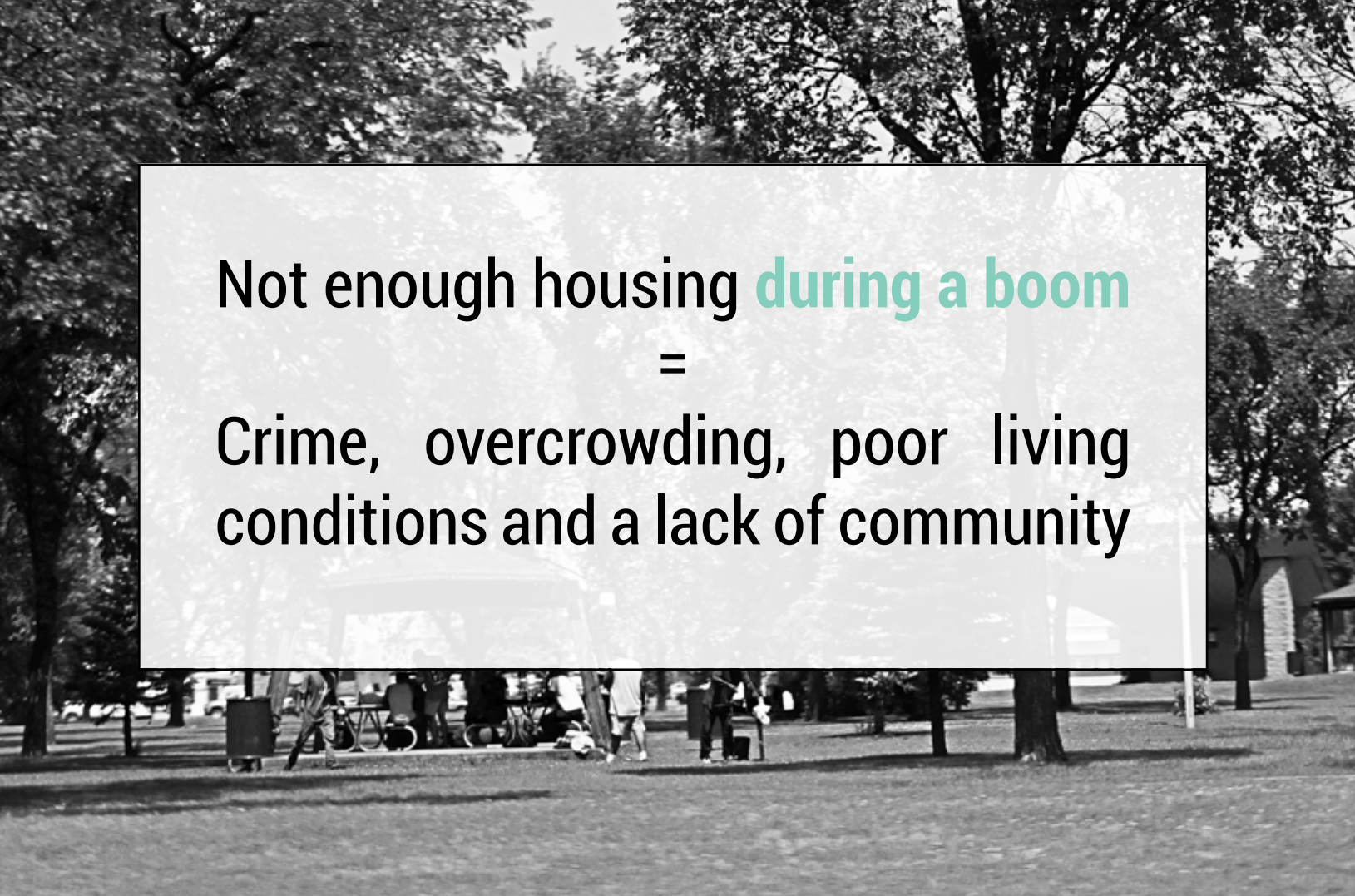


Photo by Elizabeth Hawks in Williston,
ND July 2012.




“ We want to remain a place where people want to live, and prevail as a better community than when it all started”

- Ward Koeser, Williston, ND Mayor



Not enough housing **during a boom**
=
Crime, overcrowding, poor living
conditions and a lack of community

Homeless living in downtown Williston park. Photo by Elizabeth Hawks. July 2012



Too much housing **after a boom**
=
Crime, dilapidated neighborhoods,
poor living conditions and a lack of
community

Abandoned apartment in Detroit, MI. Detroit's Beautiful, Horrible Decline. Time. Yves Marchand and Romain Meffre [http://www.time.com/time/photogallery/0,29307,1882089_1850981,00.html]

Protecting the Small Town

In order to design development for protection of the small town from a bust scenario, goals have to be created with the future in mind. The goals for new development need to accommodate for the present populations needs for shelter and community as well as for the future permanent population of the boomtown. The development is more than just housing and retail, but rather an entire system put in place to ease the transitions from small town, to boom town, and back to a stable small town state. Before deciding on the priority needs of what the new development should accomplish, the main issues for the city, its residents and its guests have to be determined.

Major issues in growing Williston:

1. Lack of immediate housing.

What a lack of housing causes is more than just an issue of homelessness among the new arrivals in Williston. The lack of housing also inflates prices beyond the means of service-sector and mid-level income employees. It becomes increasingly difficult for schools to hire teachers or for hospitals to hire nurses and support staff who cannot afford even a small apartment.³ This is then a problem for the entire town who have to then deal with overcrowded schools or wait times of over 2 hours no average at a doctors office.

The increase in homeless as well as the increase in single-male demographics is also directly related to the increase in crime within the

city. Not everyone who flocks to the area of opportunity finds employment and the city finds more homeless and in-need than it's services is capable of assisting. This has gotten to such a point that charities have begun to assist homeless by purchasing tickets in order for them to leave Williston and return to their home towns.

2. Lack of Community Identity.

The lack of housing and higher crime rates are not the only reason many chose to take advantage of employment within the state but chose to keep their permanent resident elsewhere, or to leave families at home while traveling to the area for work. Within the rapidly growing city, industrial buildings, government buildings and large housing units take precedent over community activity and recreational



attractions.⁴ It is difficult to find family-oriented activities such as trails or beautiful parks while attractions such as bars and gentleman's clubs continue to grow their businesses. There are those who can afford the inflated housing prices but still opt not to view Williston as a home town due to its lack of attraction to families. The town is seen purely for its employment opportunities and permanent residents suffer from this shifted attitude. This will also lead to a more dramatic bust at the end of the boom period as the town will not have a large enough portion of permanent residents to remain a stable economy.

3. An abundance of housing when the boom goes bust.

The lack of housing is just the immediate issue. Planners struggle to balance necessary growth and development with the future needs of the city. There will be an inevitable

exodus from the area and the small town must be able to calculate the amount of accommodations to provide for the present without leaving too much to handle in the future.

Abandoned housing, scattered developments, holes in neighborhoods are all a symbol of blight that are known to lead to an even further increase in crime and detachment from a community identity. The town must have a plan for re-purposing, redistributing or disposing of what is left after a boom goes bust.

Information found in Williams County comprehensive plan [http://www.williamsnd.com/usrfiles/WillCoCompPlanDraft_Sept2012_Part1b.pdf]

Williston Protection Plan

1. Create a development which can quickly expand and contract with the needs of the city.

A housing community design that is able to be quickly assembled as well as deconstructed would solve the most pertinent problems within a city that is rapidly growing. The development will house the immediate need of homeless workers and their families and would not leave the city with more housing than is necessary when the boom is over. The community will not only be deconstructed, but be able to be moved in mass quantities to new locations as the boom moves to new areas of the country.

2. Prevent Over-Development from within the existing city.

Zones within a city that sit empty or abandoned at the end of a boom help to incubate crime and the lack of community within a city. In order to prevent such areas, the new development will be sited in such a way, it will be convenient for workers both in and outside of the city, but far enough from the city center, that when the boom is over, the land can return to productive crops or wilderness areas.

3. Design for public programs to create community between permanent and transient populations.

There are two types of residents in a boom city: transient and permanent. In a growing city, there is often a separation in the needs and wants of these two groups. By creating a community with attractions, activities and recreational opportunities, both groups can come together and create a new community identity. Temporary workers can find a home away from home and permanent residents can feel as if their town is still their home.

4. Leave minimal impact on site which, when gone, can return positive benefits for the city.

The design should leave a positive impact, not decay and crime. In order to “leave the city better than when it all started,” the design must be planned for during the boom, the transition after the boom, and for the calm when it is all over. The plan will not be just for immediate accommodations, but be designed to continue to be beneficial for the community long after its initial use is over.



Rows of new apartment buildings in Williston, ND. Photo by Elizabeth Hawks. July 2012

1. Irvine, Martha. 09/ 2/11 "North Dakota Oil Field 'Man Camp'." Sept. 2, 2011. <http://www.huffingtonpost.com/2011/09/02/north-dakota-oil-field-housing_n_946349.html>
2. Eligon, John. "An Oil Town Where Men Are Many, and Women Are Hounded." The New York Times, January 15, 2013. http://www.nytimes.com/2013/01/16/us/16women.html?smid=pl-share&_r=1&
3. Williams County 2035 Comprehensive Plan
4. "Episode 428: Turning A Boom Town Into A Real Town." Planet Money. NPR. April 1, 2010. Web Radio.



In order to preserve the small towns, playing host to the population explosion due to the new economy, a new community must be created. This community will be one to accommodate the excess influx and leave the host city better than when it all began.

Determining Community Site

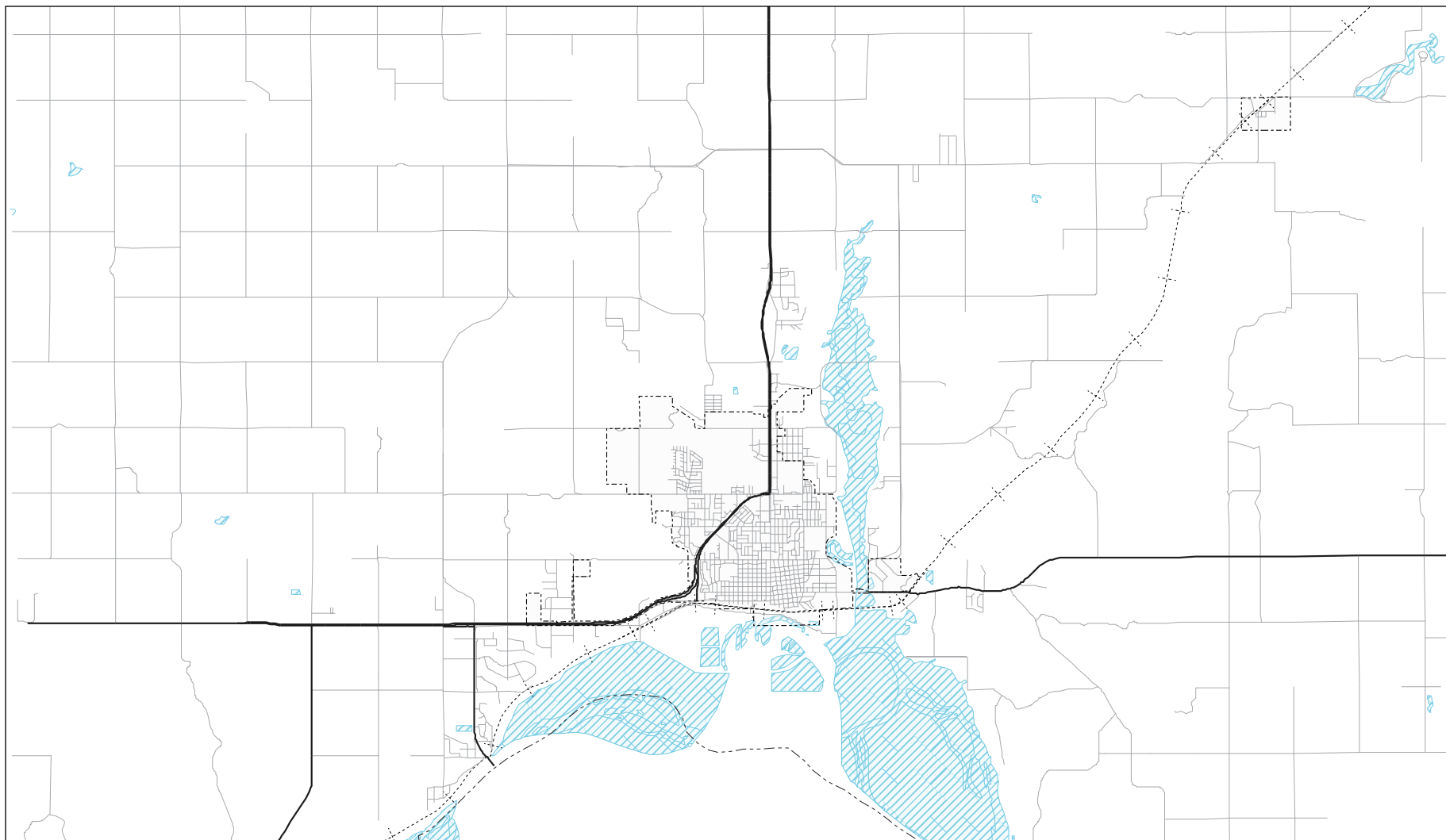
The site for the temporary community will depend on the connection to the host city as well as to working sites in the surrounding area. The ease of construction and deconstruction also has to be taken into account. There are certain aspects of the cities growth that have to be considered. The temporary community should be located in an area that, when it is time to deconstruct, will not leave an undesirable vacancy within the developed part of town. With these considerations in mind, there are areas related to any host city or town that should be documented in the process of choosing an ideal building site.

1. **Location of future city limits and developmental growth of the city.**
2. **Nearby active rail systems.**
3. **Major highway systems or through-ways.**
4. **Location of existing camps or informal communities.**
5. **Any areas of environmental concern.**

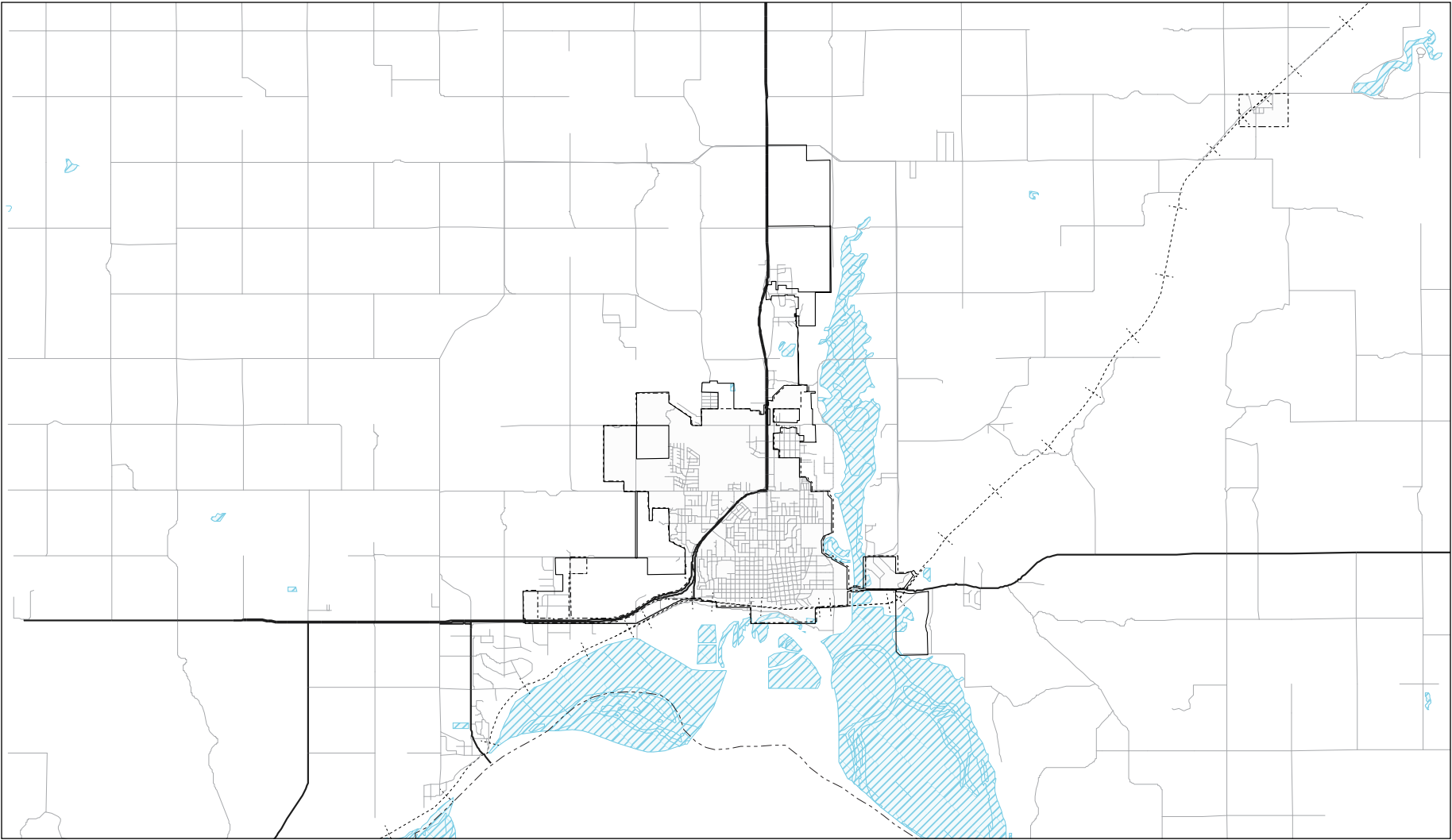


Installing new utilities in Williston, ND.
Photo by Elizabeth Hawks. July 2012

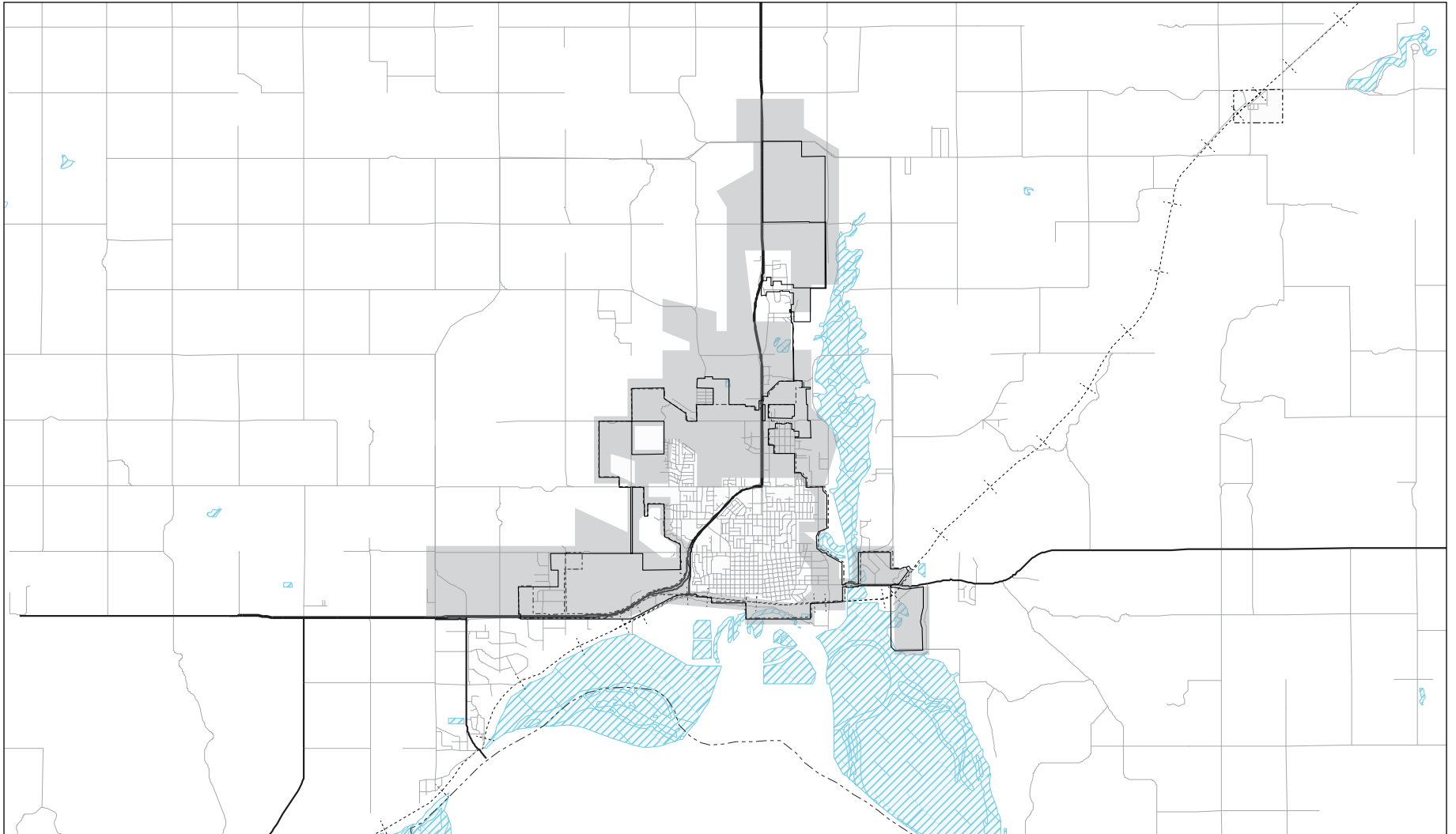
Williston, ND



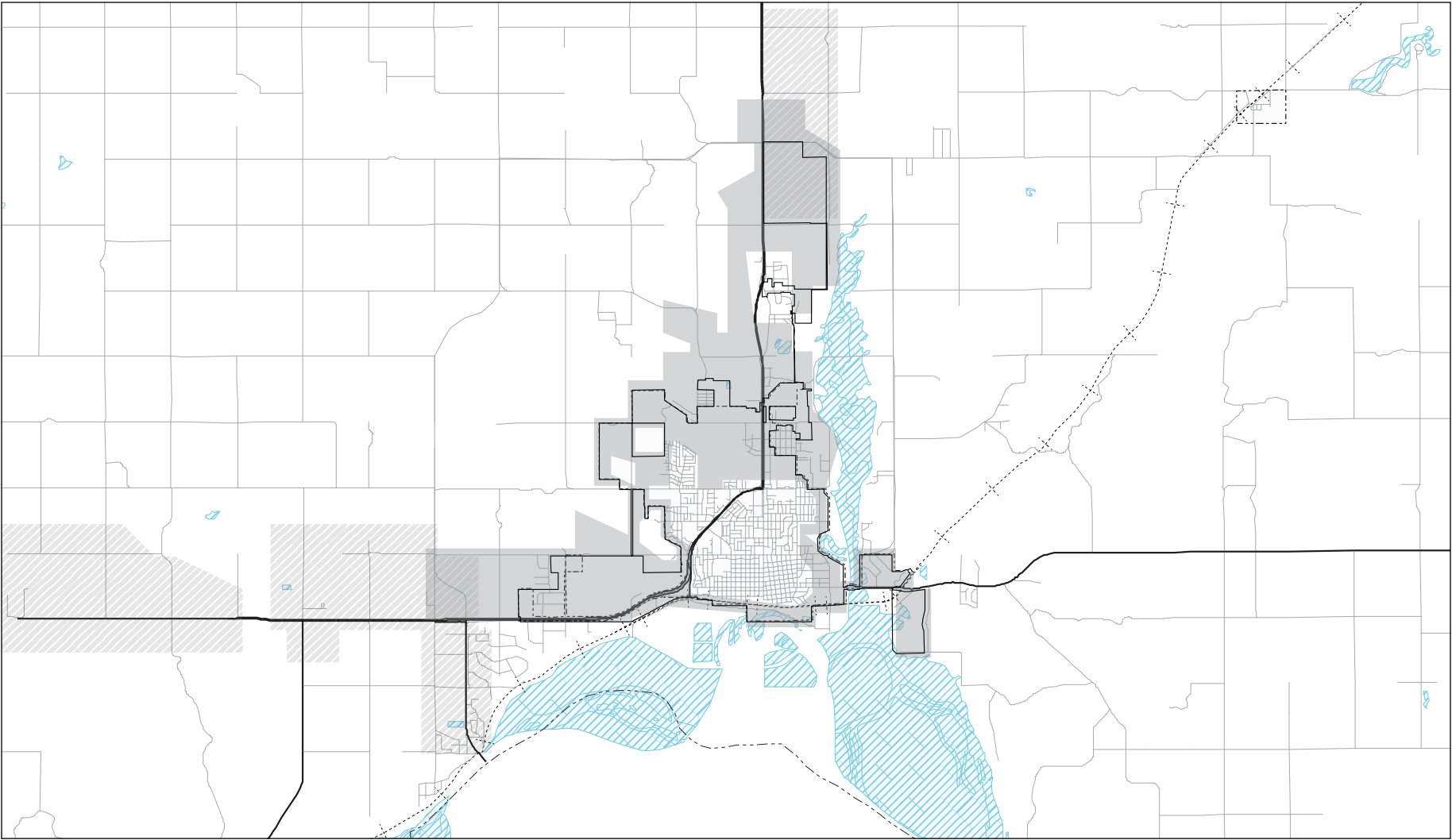
2030 City Limit Expansion



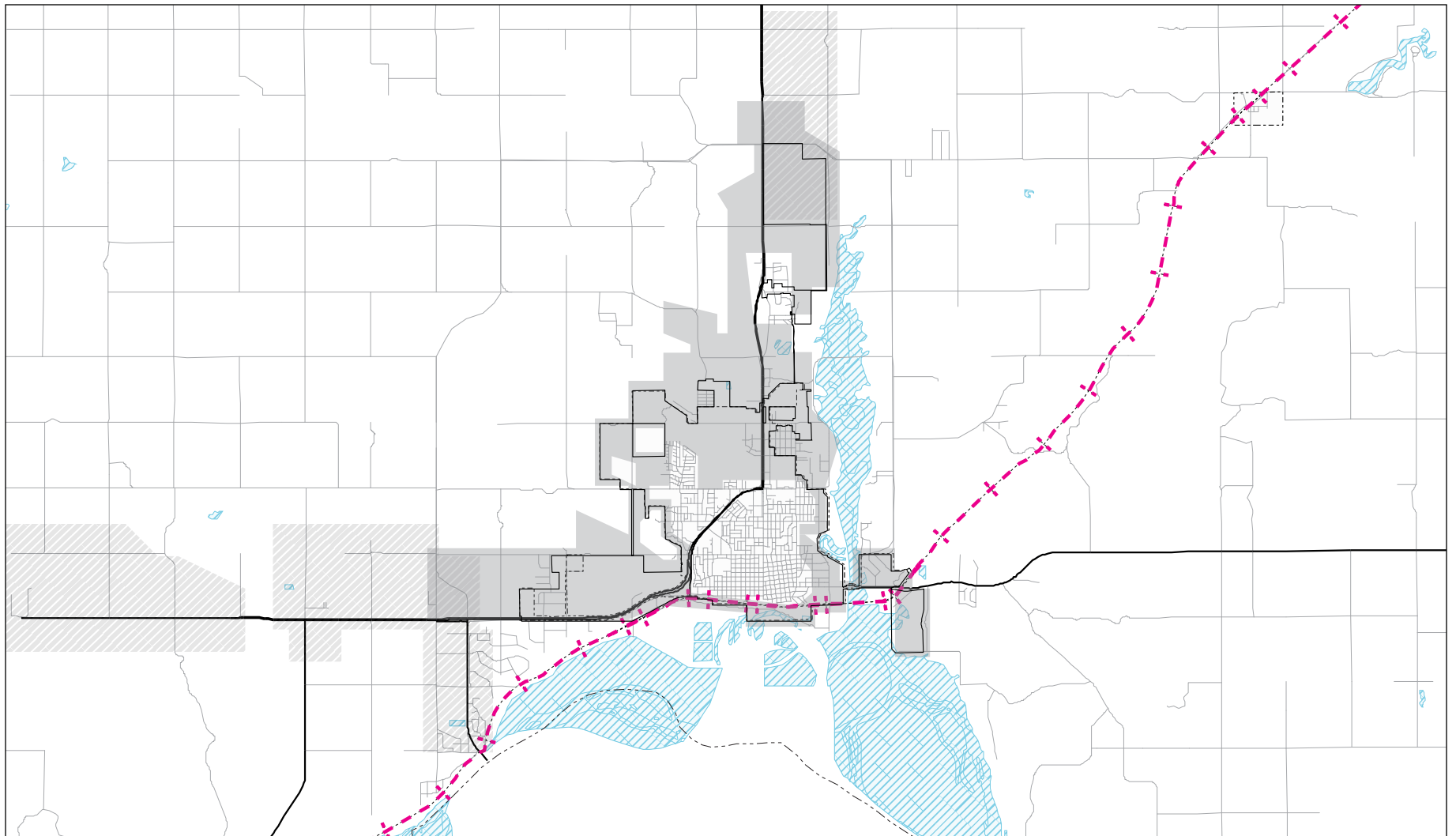
2030 Development Growth



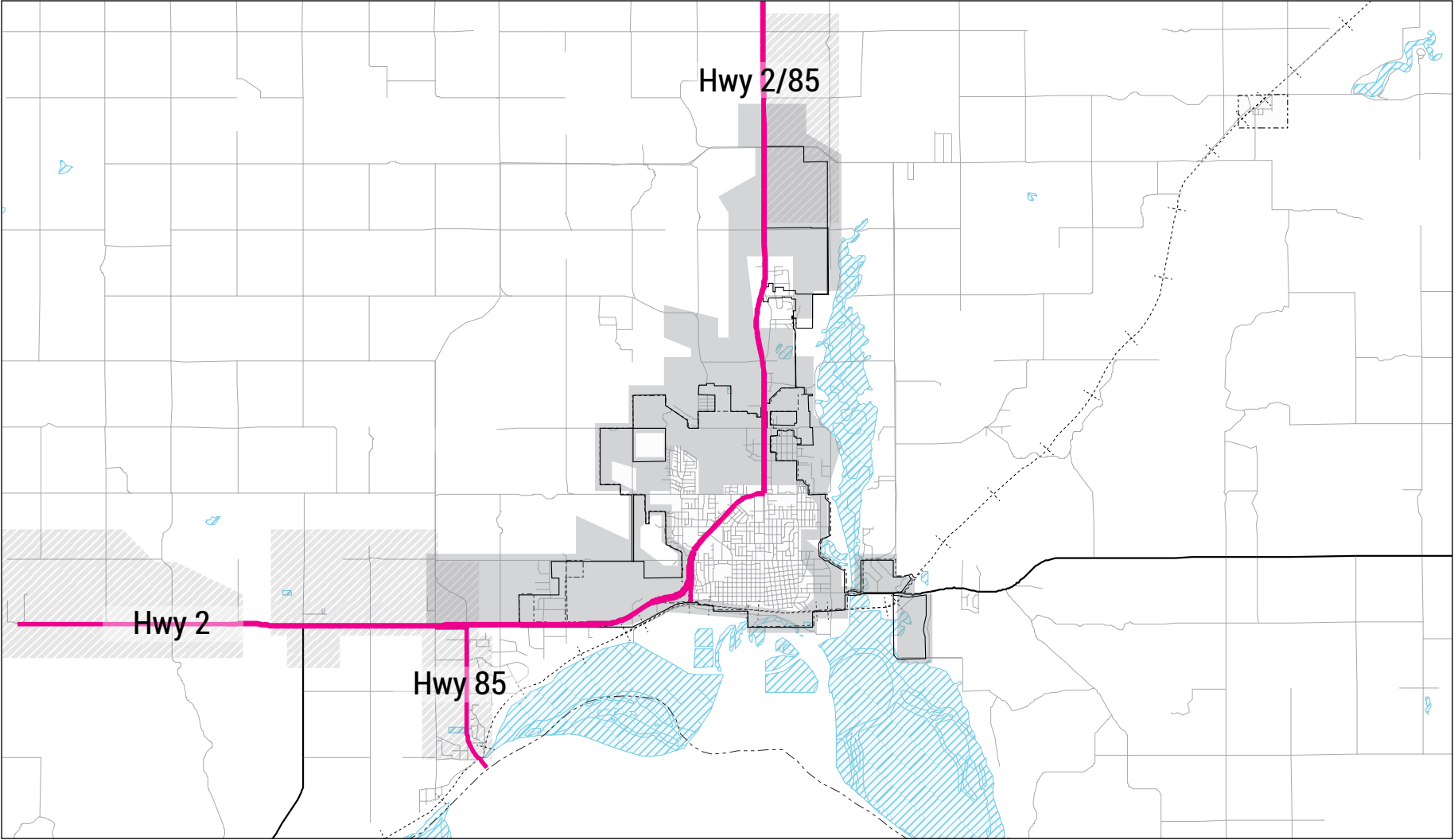
2030 Industrial and Economic Growth



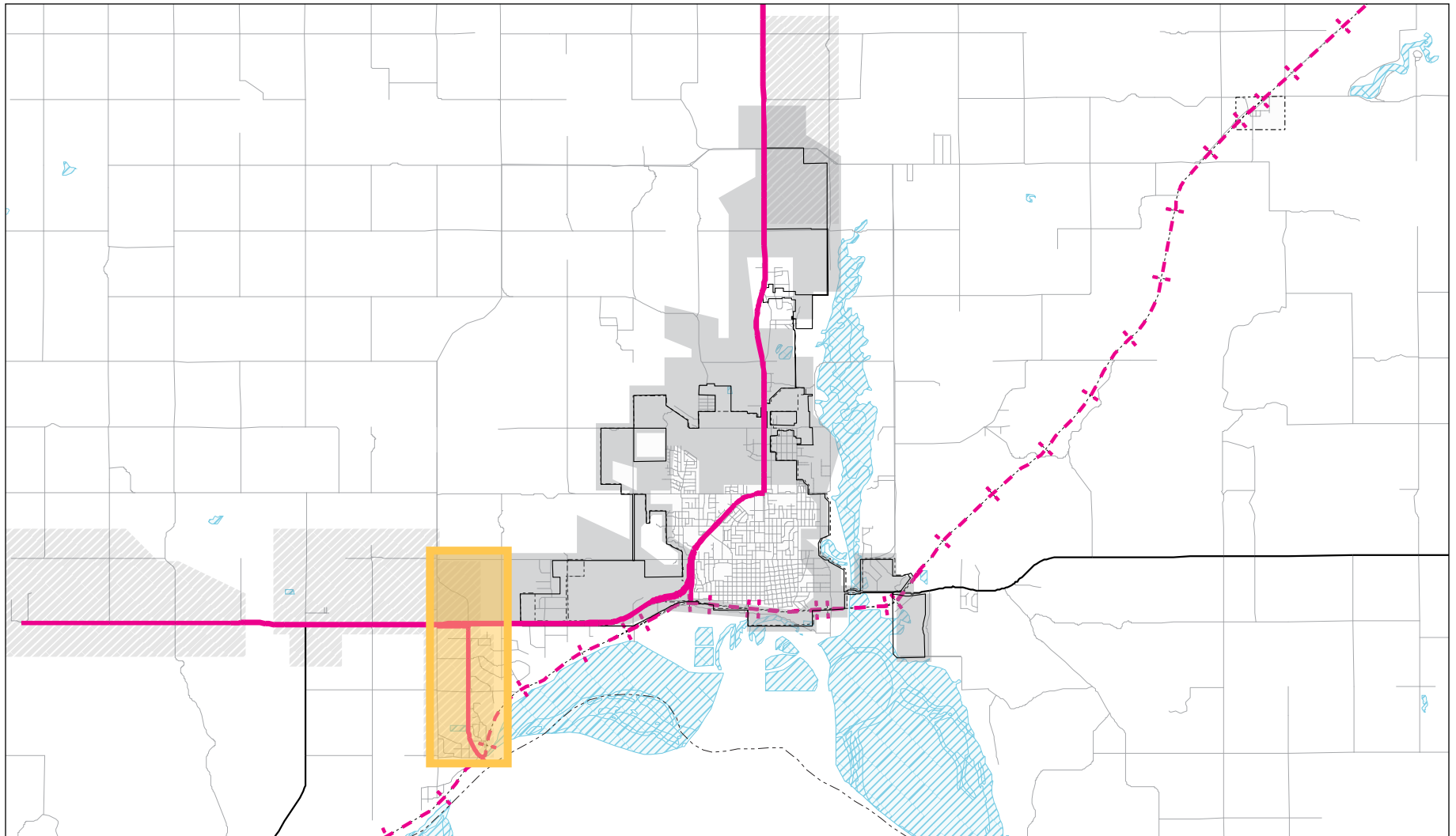
Railroad



Main Highway and Through-way



Community Site Location



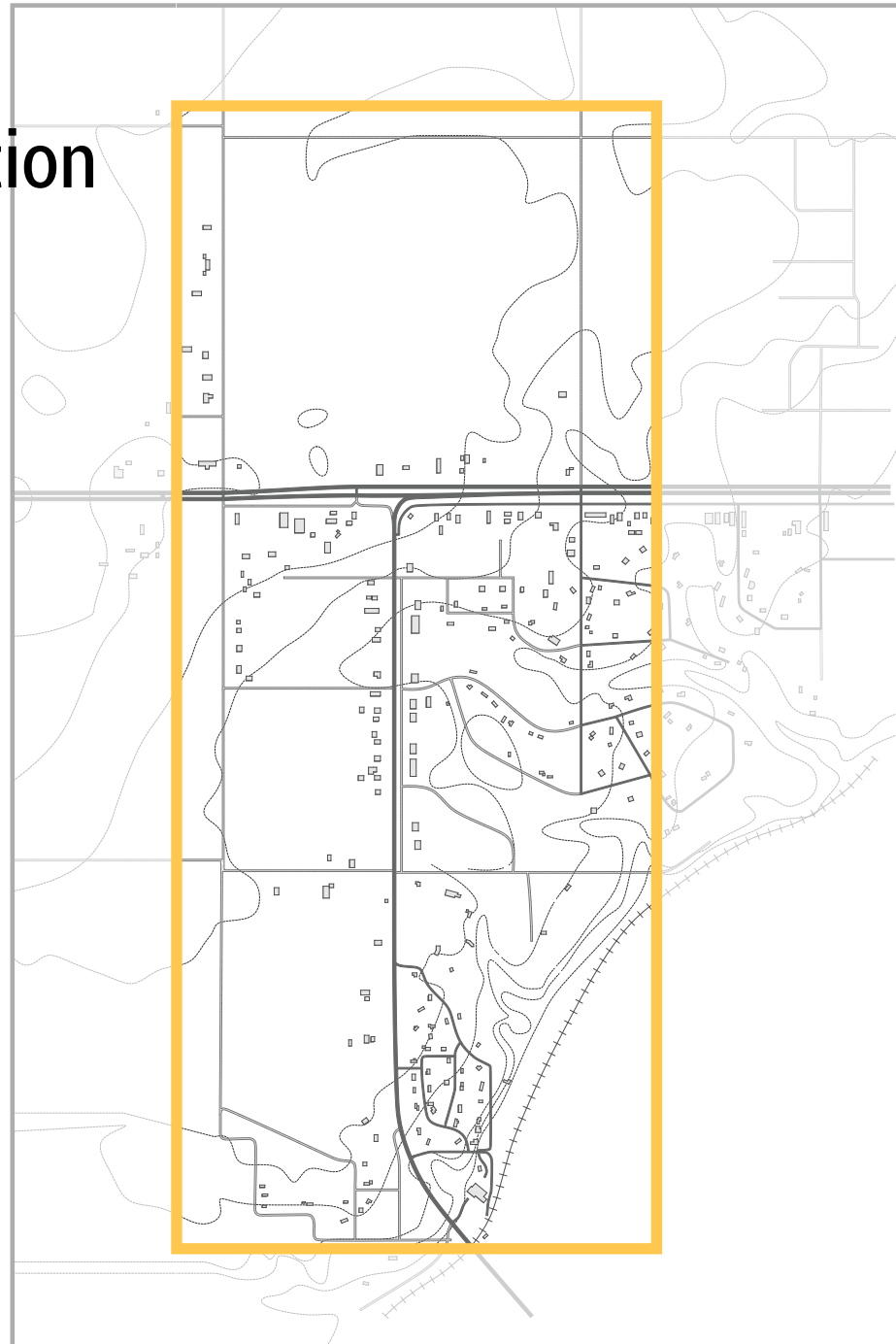
Final Site Selection

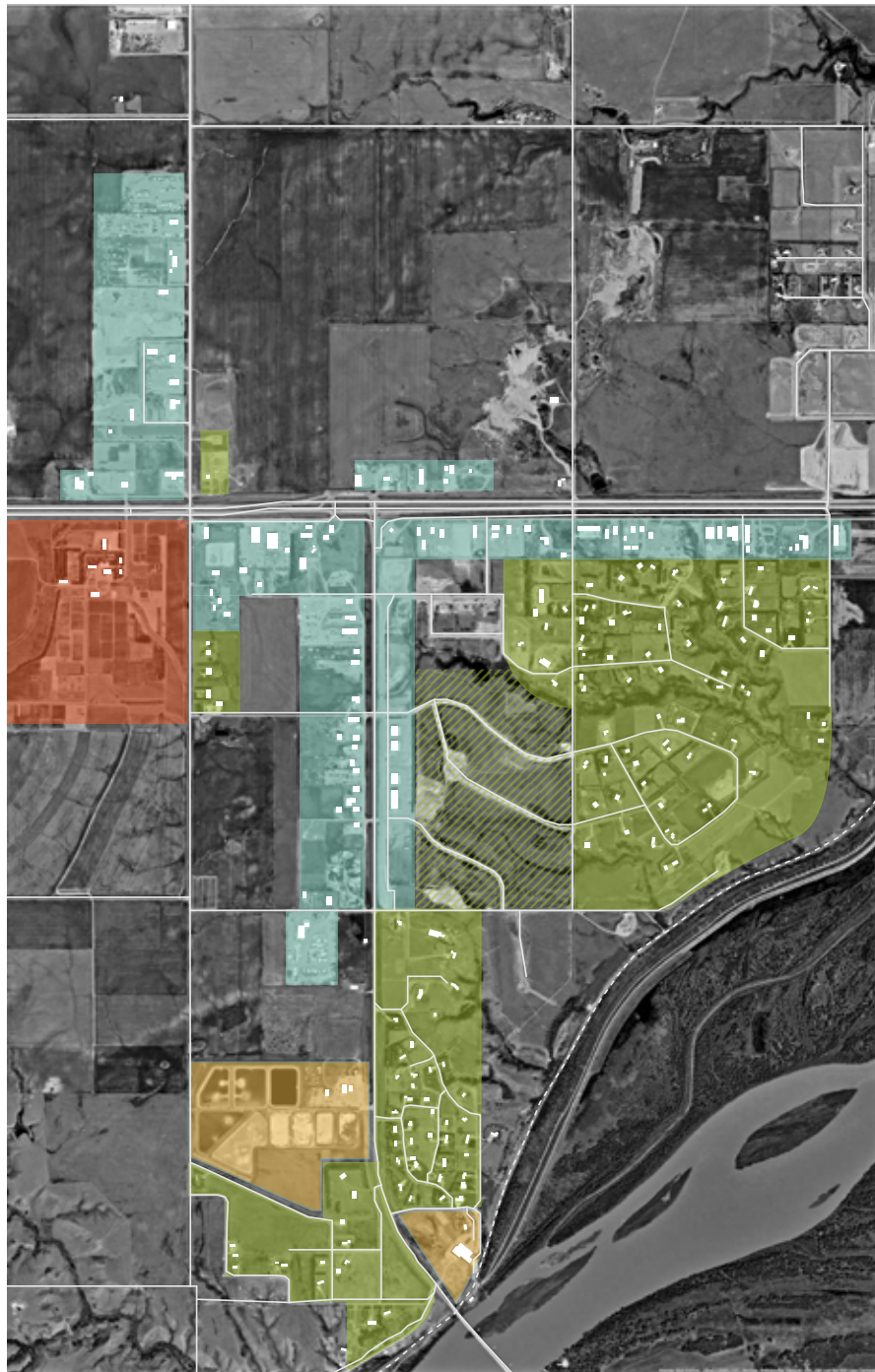
The selection of the final site is at the crossing of the two main highways that bisect the town and the railway. The area is located along a mostly industrial zone, though there is some semi-rural development, utilities stations and agriculture. The area is also on the edge of what is expected to be the new growth for the boom.

Highlighted are the developed areas of the site.

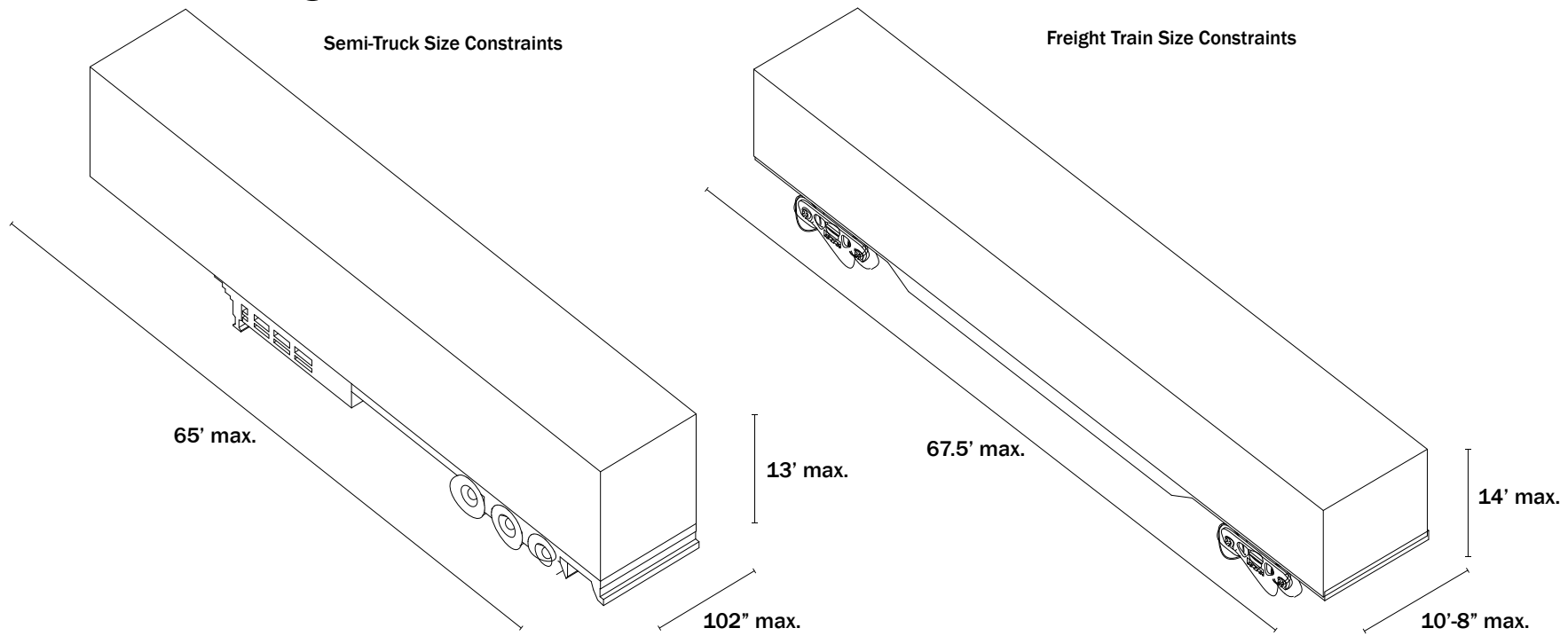
- Housing
- Industrial
- Utilities
- Agriculture

Highlighted in white is the area in focus for the new development. The area can continue to function as needed while the new housing can be seamlessly introduced.





The Housing Solution

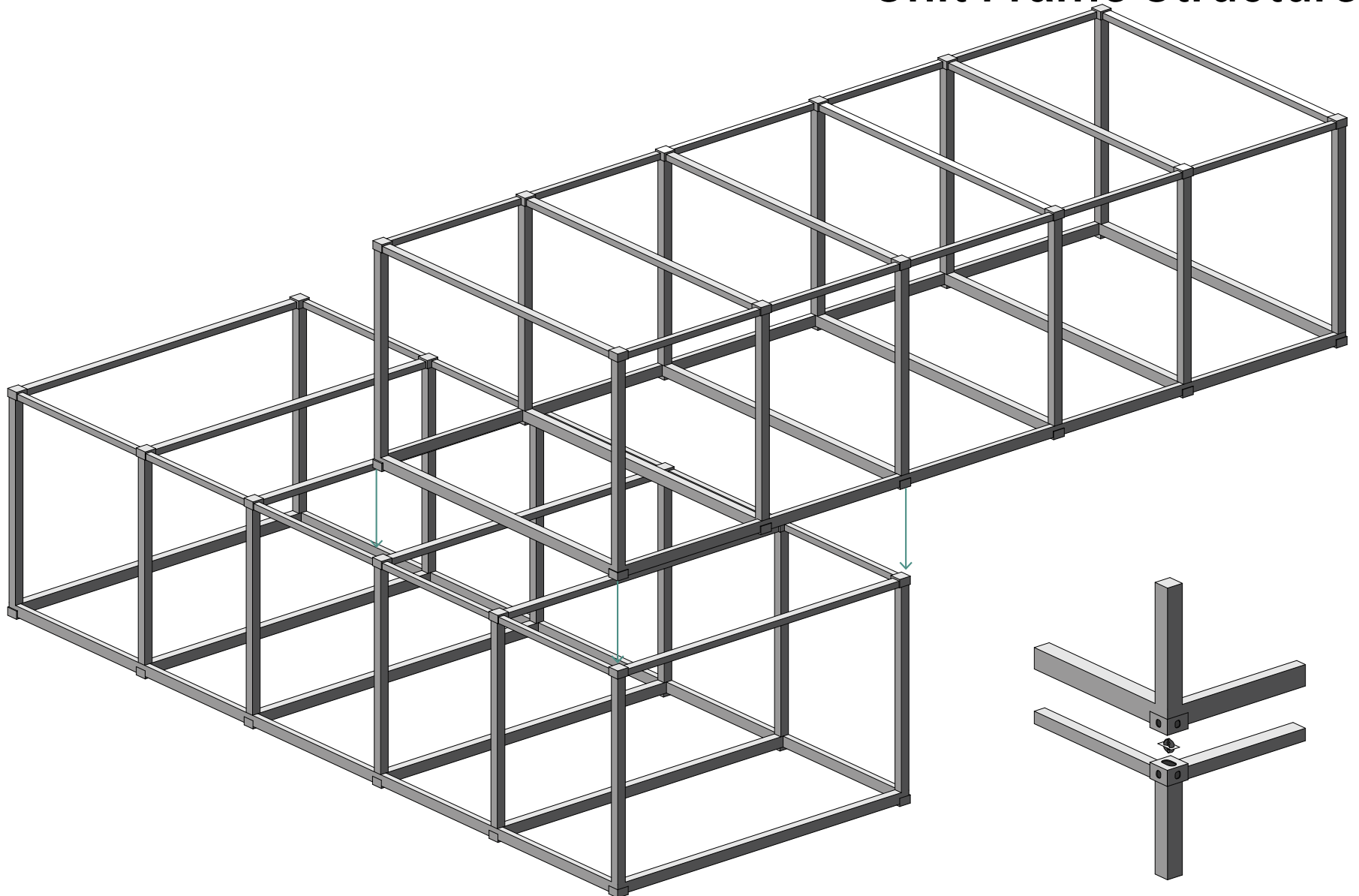


After the site was selected, a design for the housing units began with the basic unit. Based on technologies and practices that exist today, the units are made from easily-transportable frames which can be moved, assembled on-site and customizable. Each unit size is based on the modes

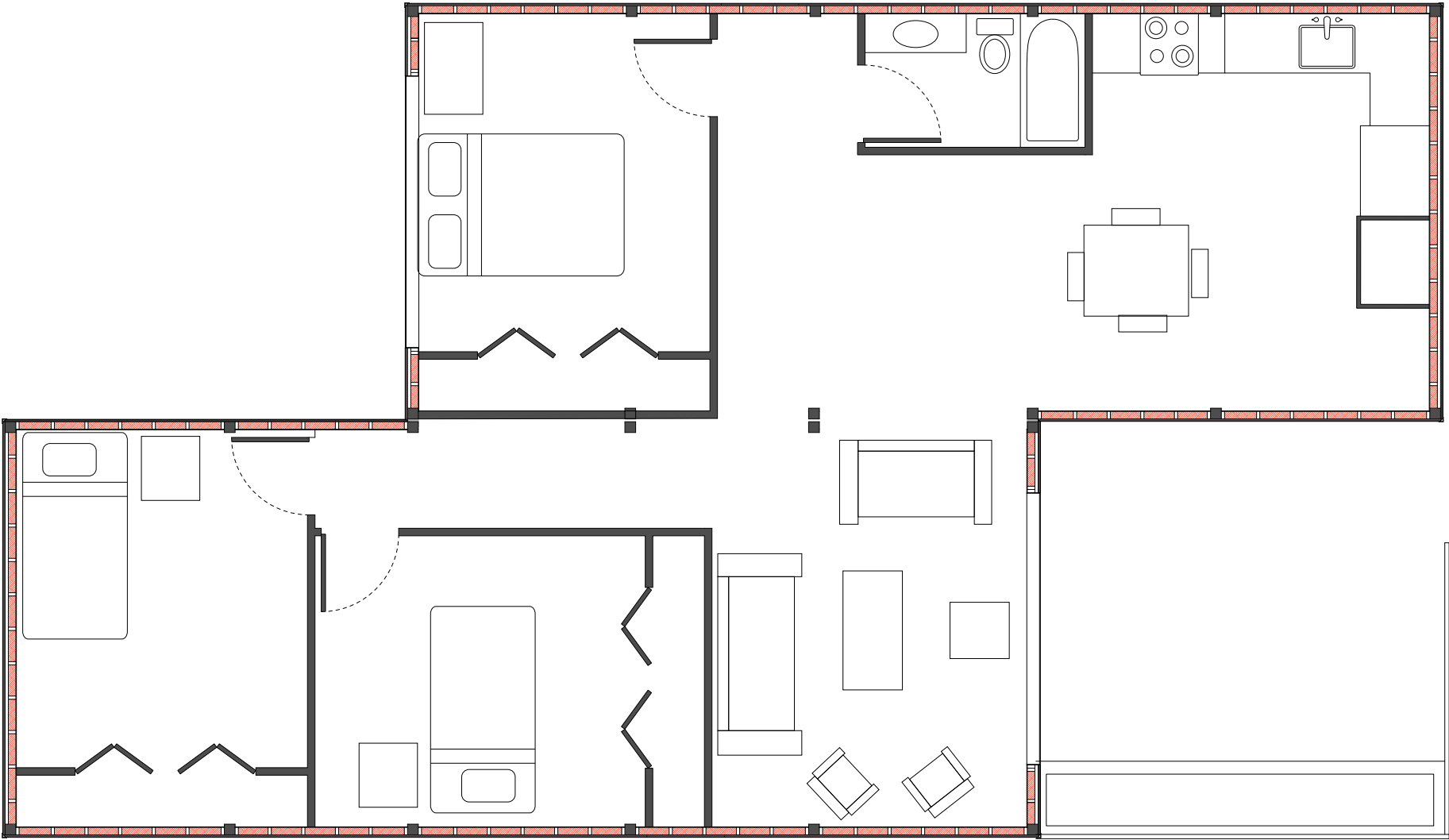
of transportation, the train car and semi-truck. The units are not made from shipping containers but rather the frame is based on the ability of such containers to be transported and securely stacked. In order to allow customization and a variety of family sizes, the frames will be assembled with

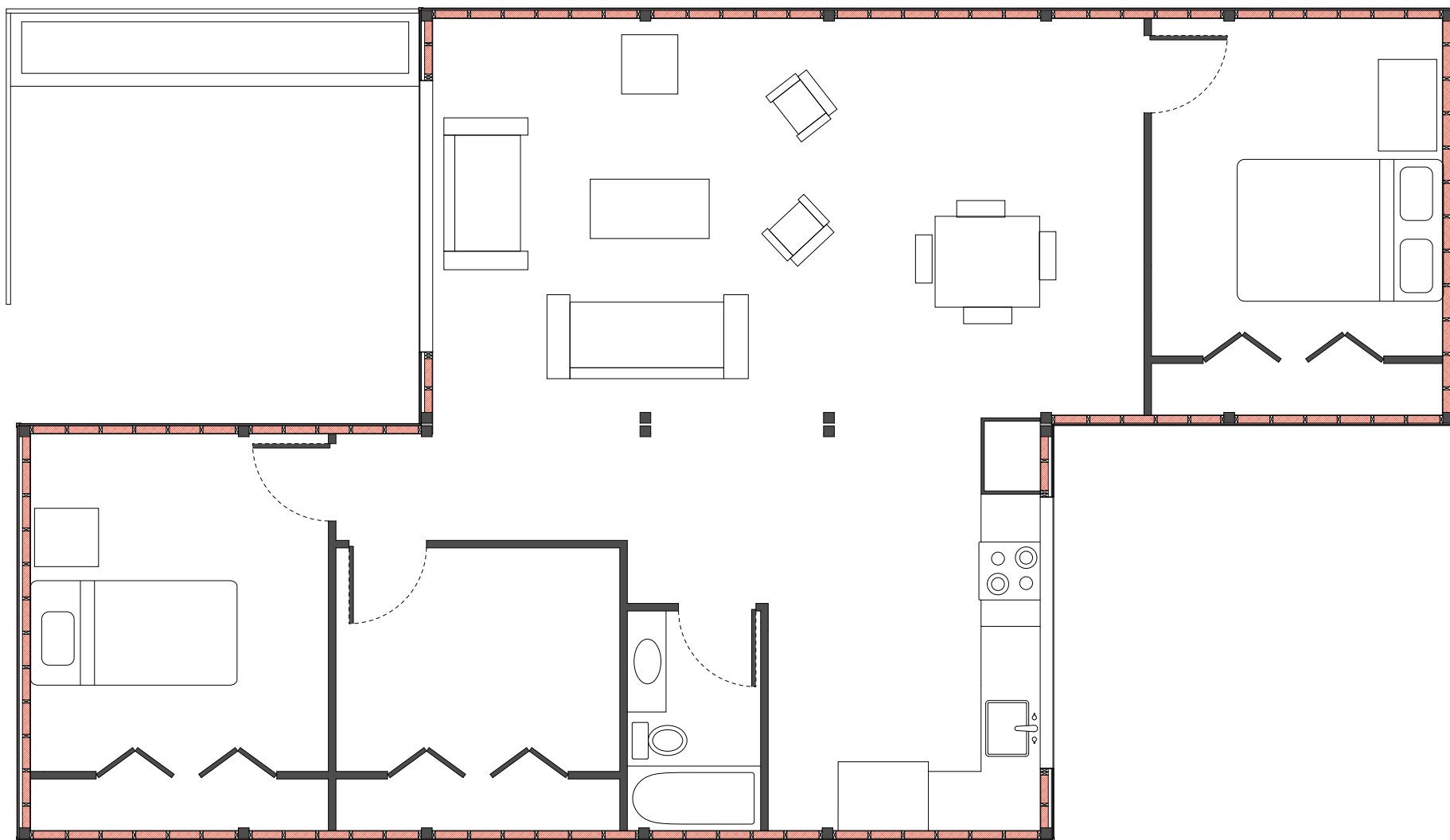
three size options. Single, double and triple-wide units, all based on the same 40 ft. x 16 ft. single unit.

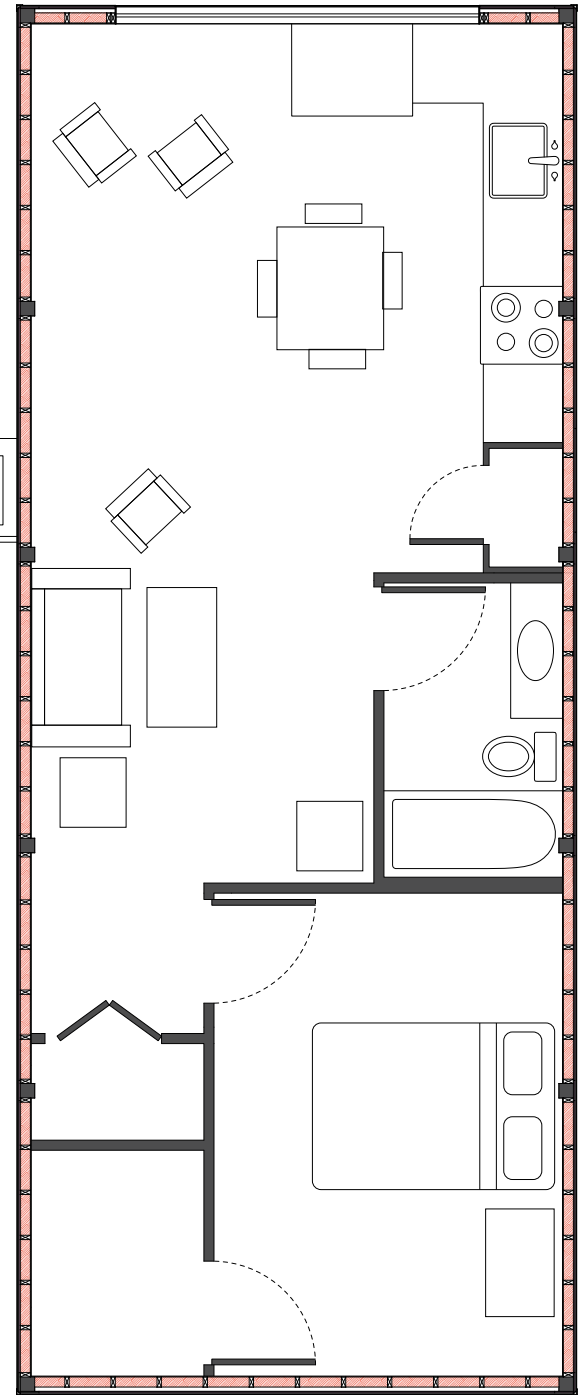
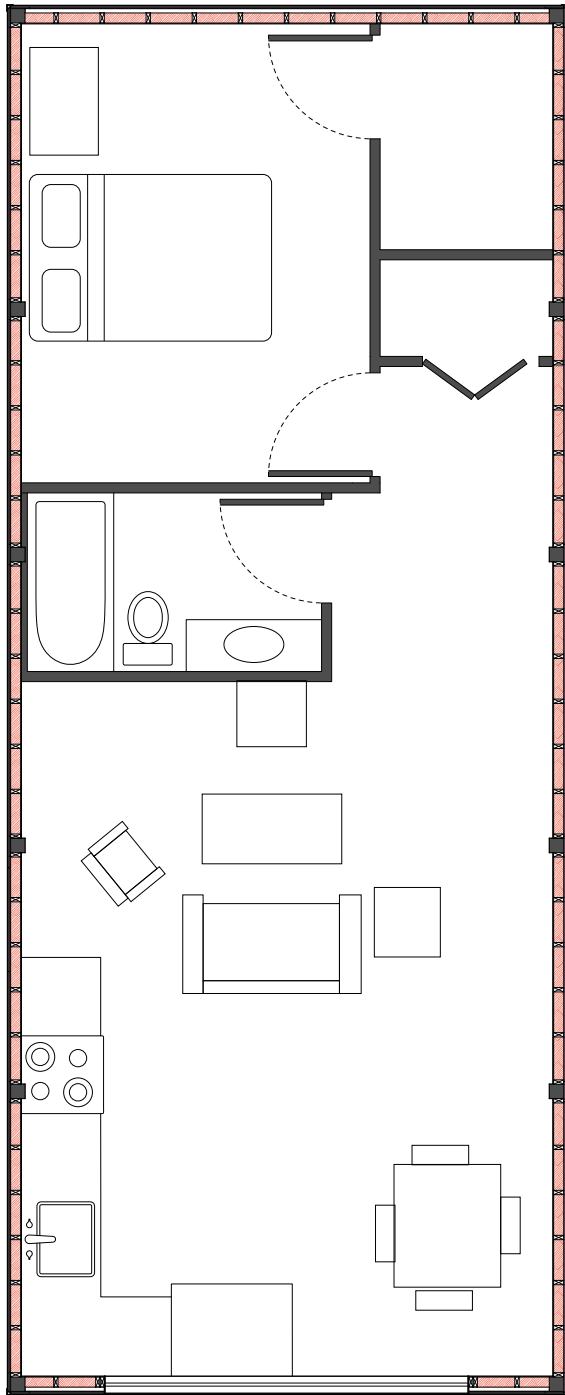
Unit Frame Structure

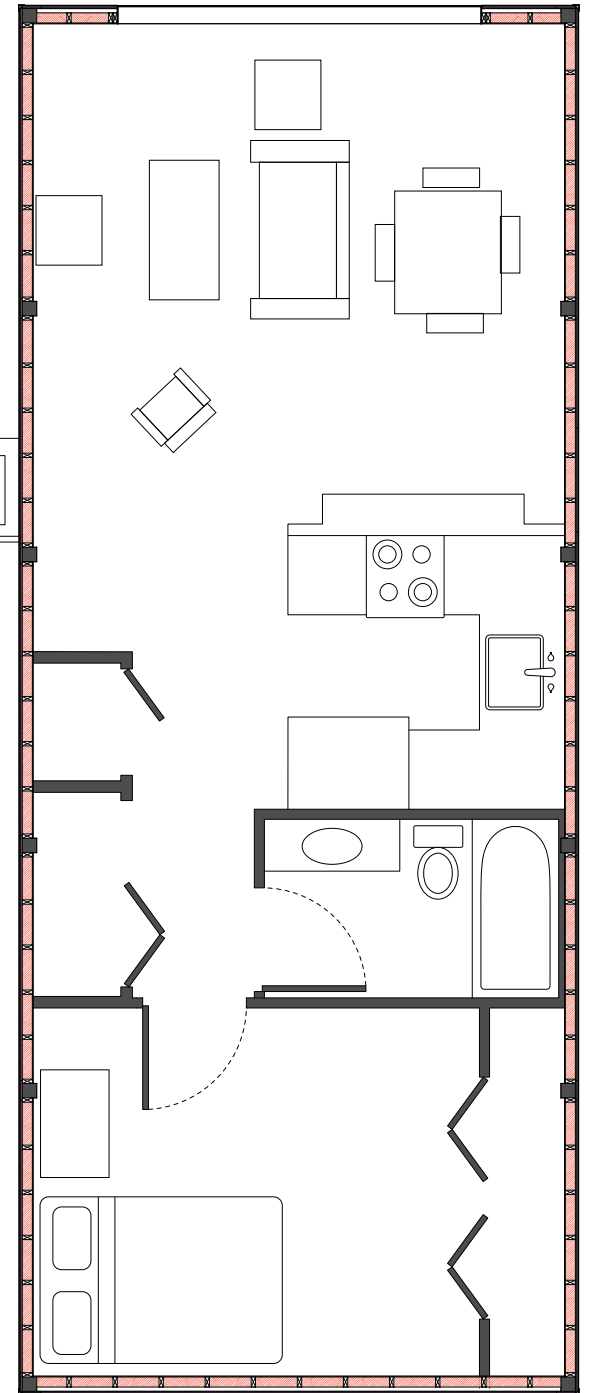
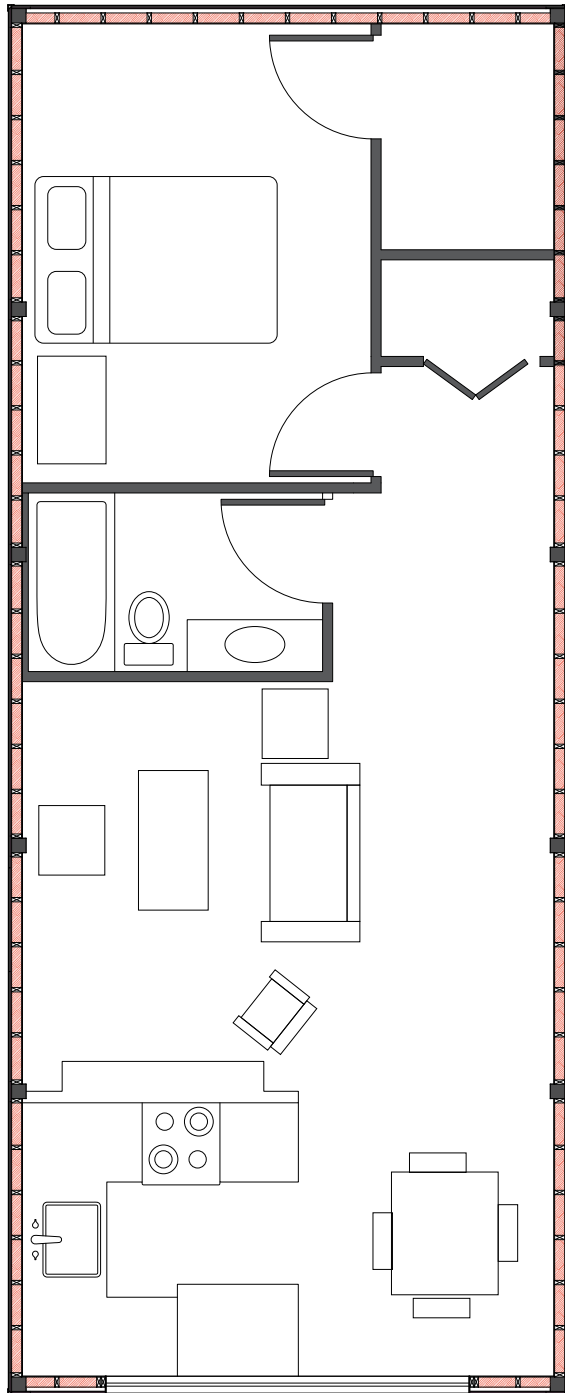


Example Floor Plans

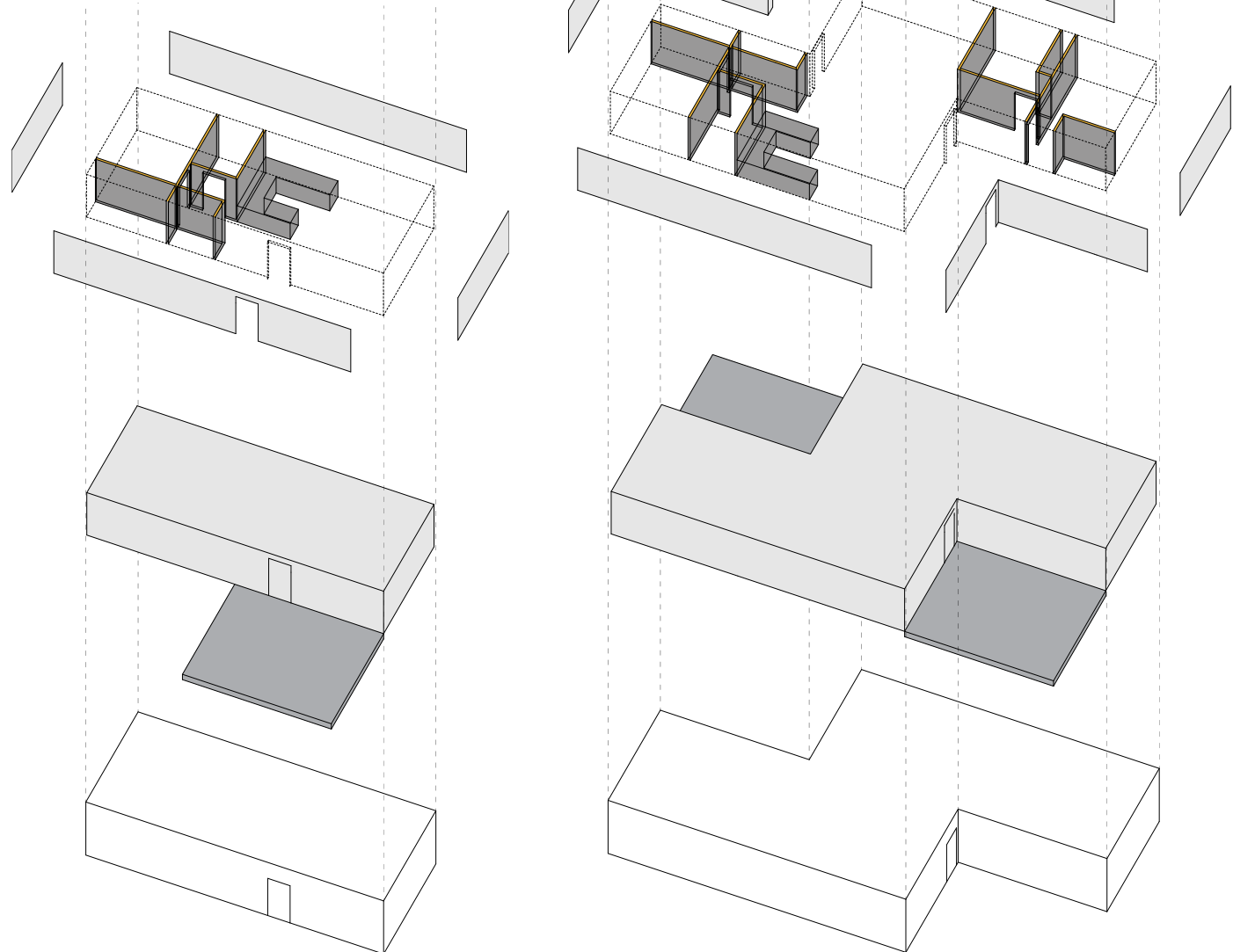


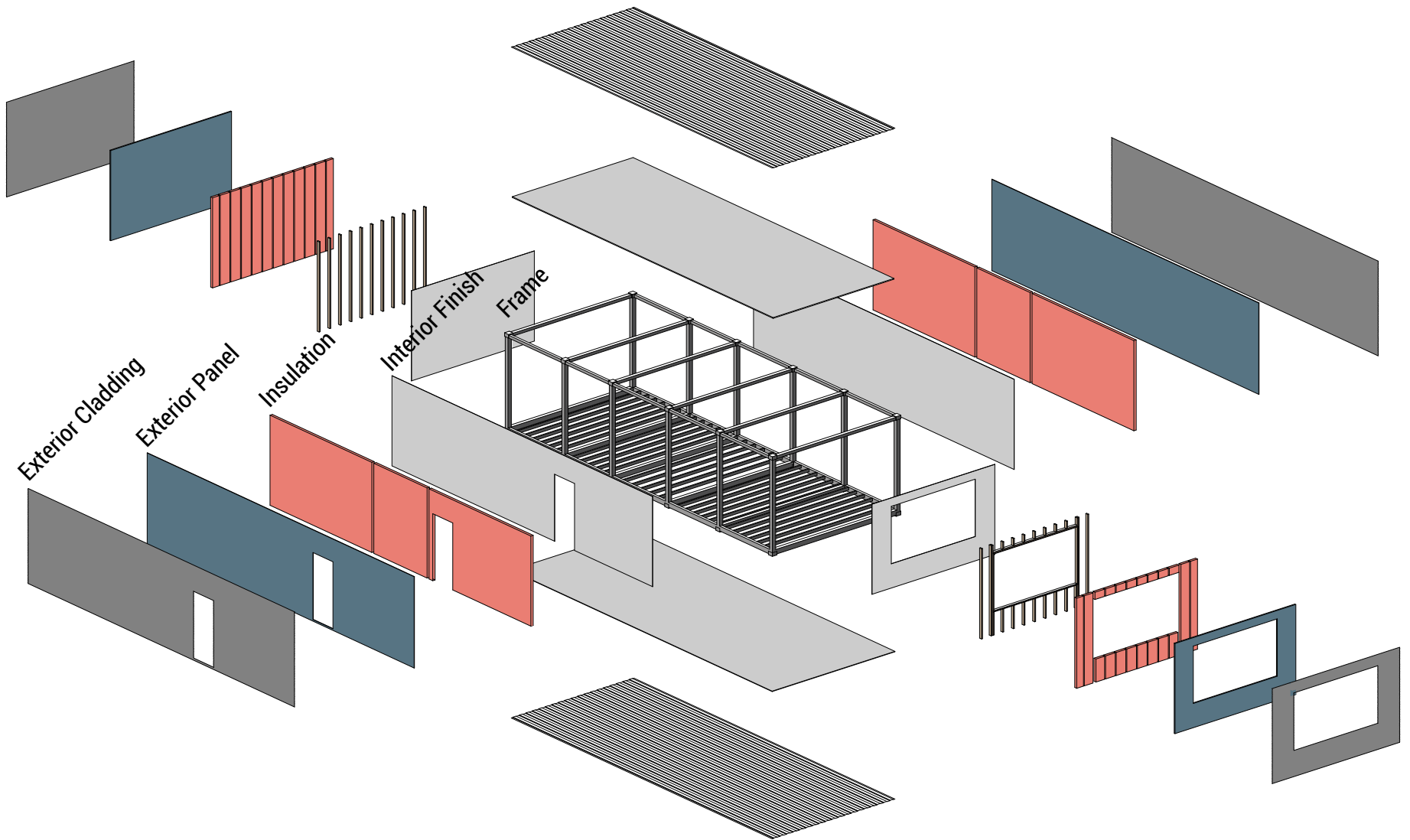






Unit Component Breakdown

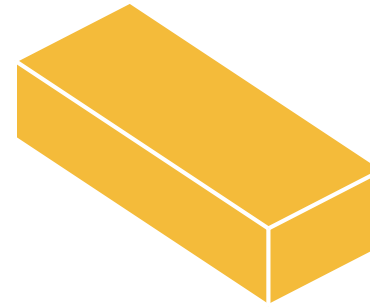




Unit Organization

Once the basic units were established, I then began to study the stacking and organization patterns for each unit. The location of certain utilities within each unit must be stacked for efficiency in assembly and the stacking must be done only in a way where the structural frames are directly in contact with each other. Each of the multiple-unit sizes were shifted in order to comply with the stacking rules. The shifting would then allow a variety of outdoor areas for each unit as well as elements of privacy for the unit.

As the organizations began to come together I set up rules for what each unit required. Each unit must have at least one outdoor patio/deck space, ample daylight which should not be blocked by upper units, and ground access well within egress standards. These rules helped to narrow down organization patterns.



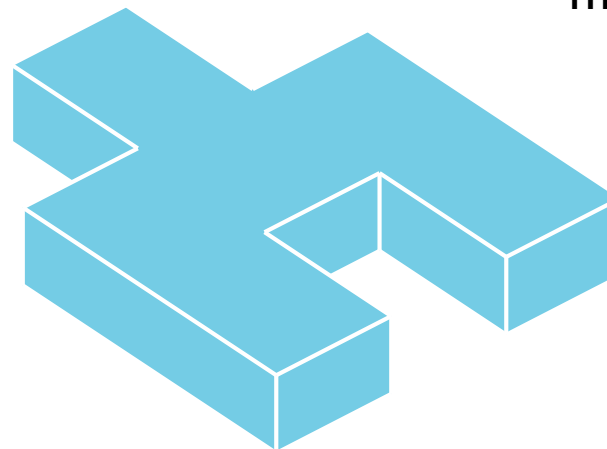
Single Unit

1 Bedroom
1 Full Bath
600 Sq. Feet
Balcony/Patio



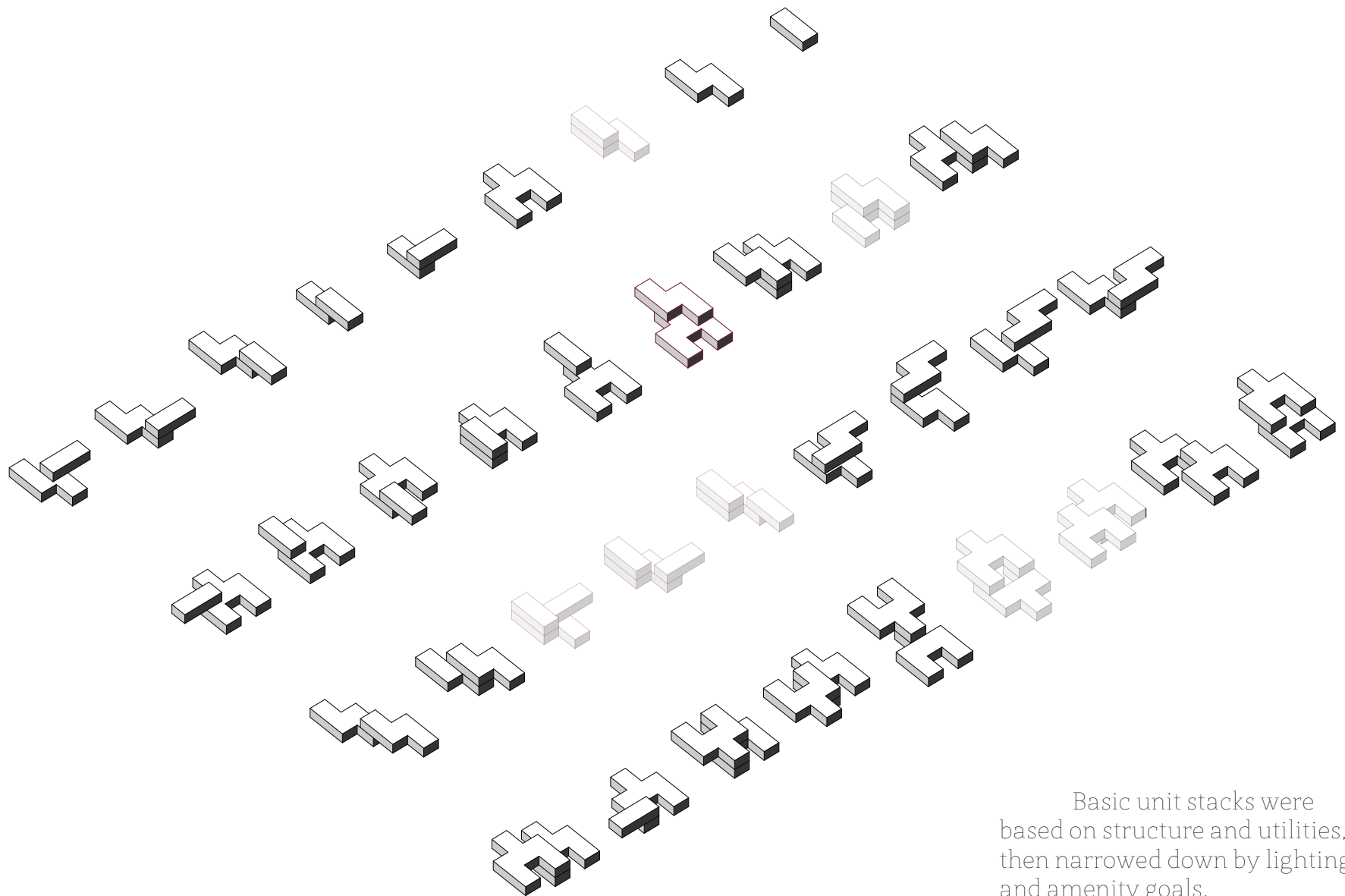
Double Unit

2-3 Bedroom
1 Full Bath
1200 Sq. Feet
Balcony/Patio



Triple Unit

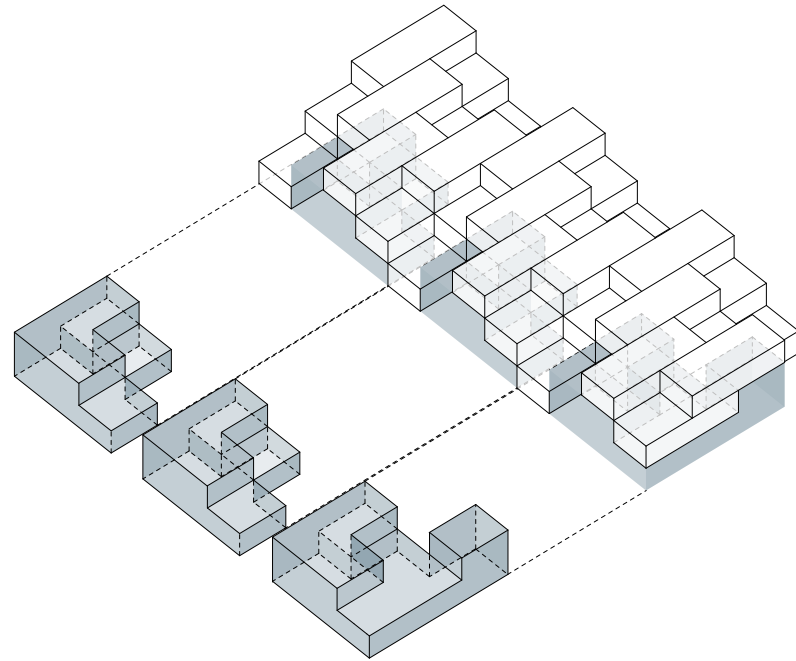
2-4 Bedroom
2 Bath
1800 Sq. Feet
1-2 Balcony/Patio



Basic unit stacks were based on structure and utilities, then narrowed down by lighting and amenity goals.

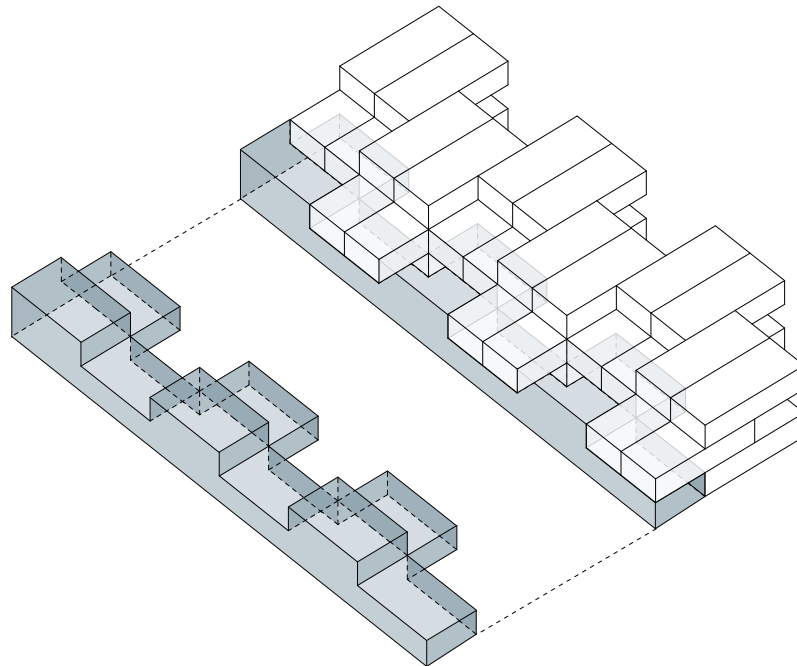
Negative Space Study

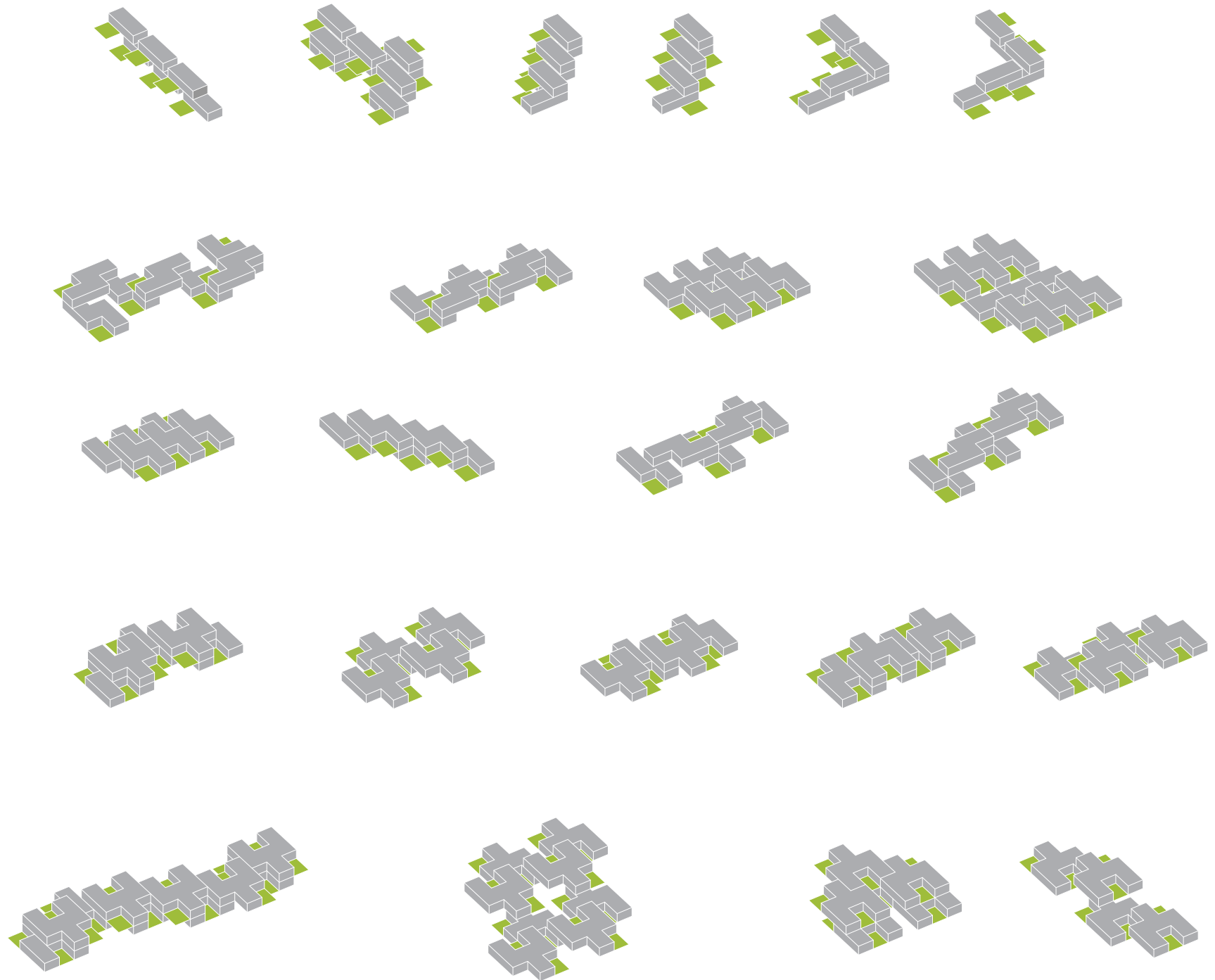
Unit stacks were also studied as far as the effects created beneath the stacked structures. Open negative spaces will go on to become semi-public areas and have potential to become interesting spacial zones.

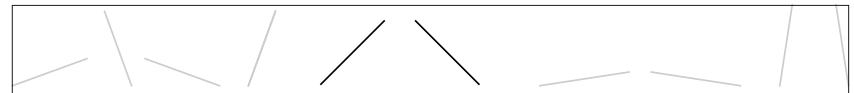
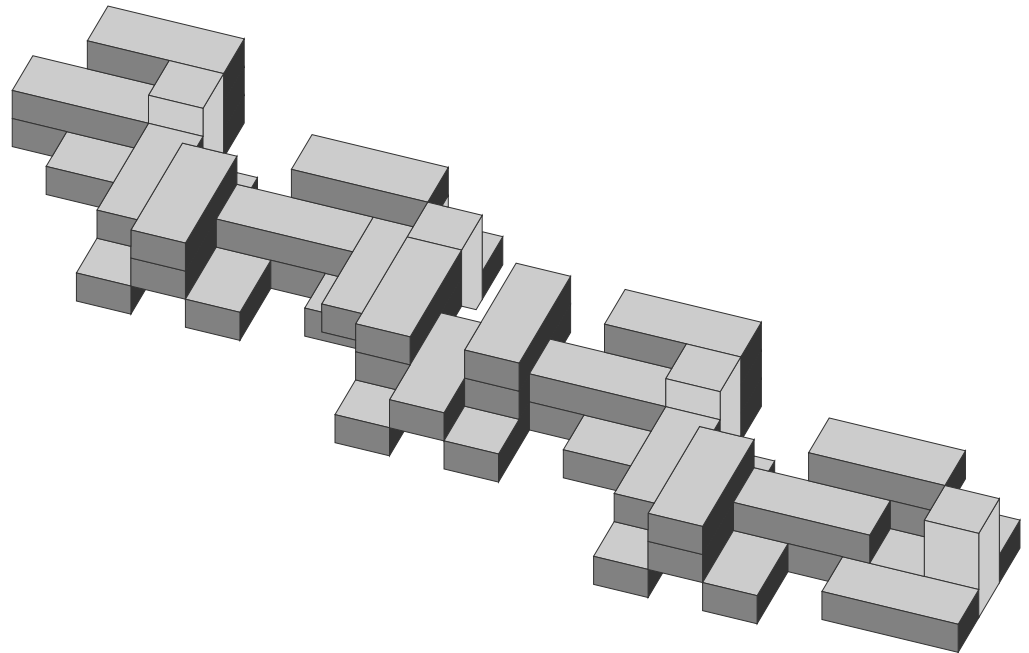
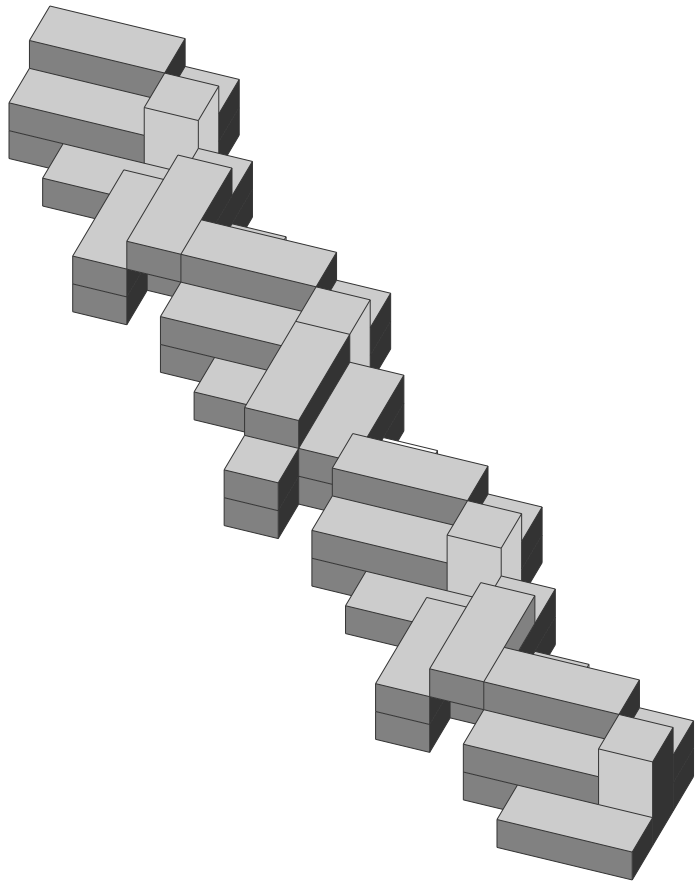


Configuration Study

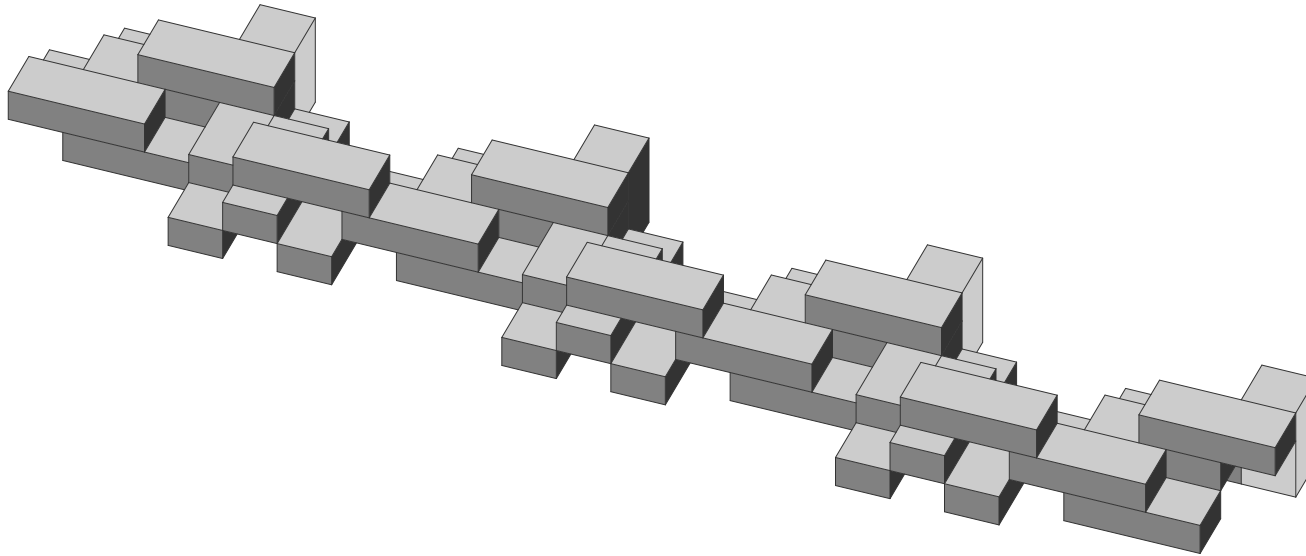
Using the basic unit stacking rules, a variety of configurations were tested. The goal is to find the configuration that gives the greatest density of housing while still allowing for unit size variety, outdoor private spaces and sun-lighting.







Final Configurations



The final result of the stacking studies fulfill each unit requirement. There are three variations of the stack in order to transition to site organization. Units will be organized on site, orthogonally to the existing street grid. This organization helps to more easily assemble the units on site and allow for more variation in site organization without causing it to become chaotic. The three stacking variations allow for ten different organization angles and therefore, can accommodate organization on a variety of sites. The stacking is also limited to three levels for the ease of resident access as well as to fit into the surrounding development landscape.

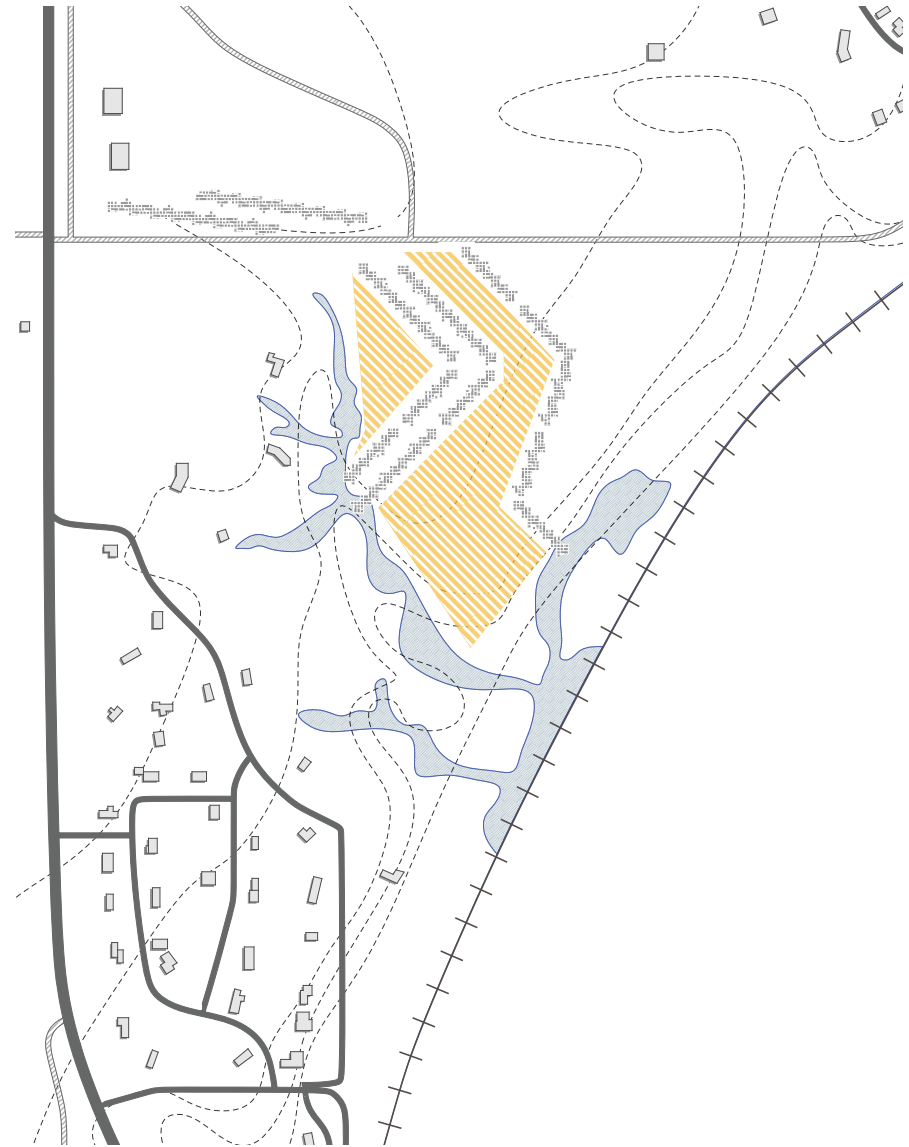
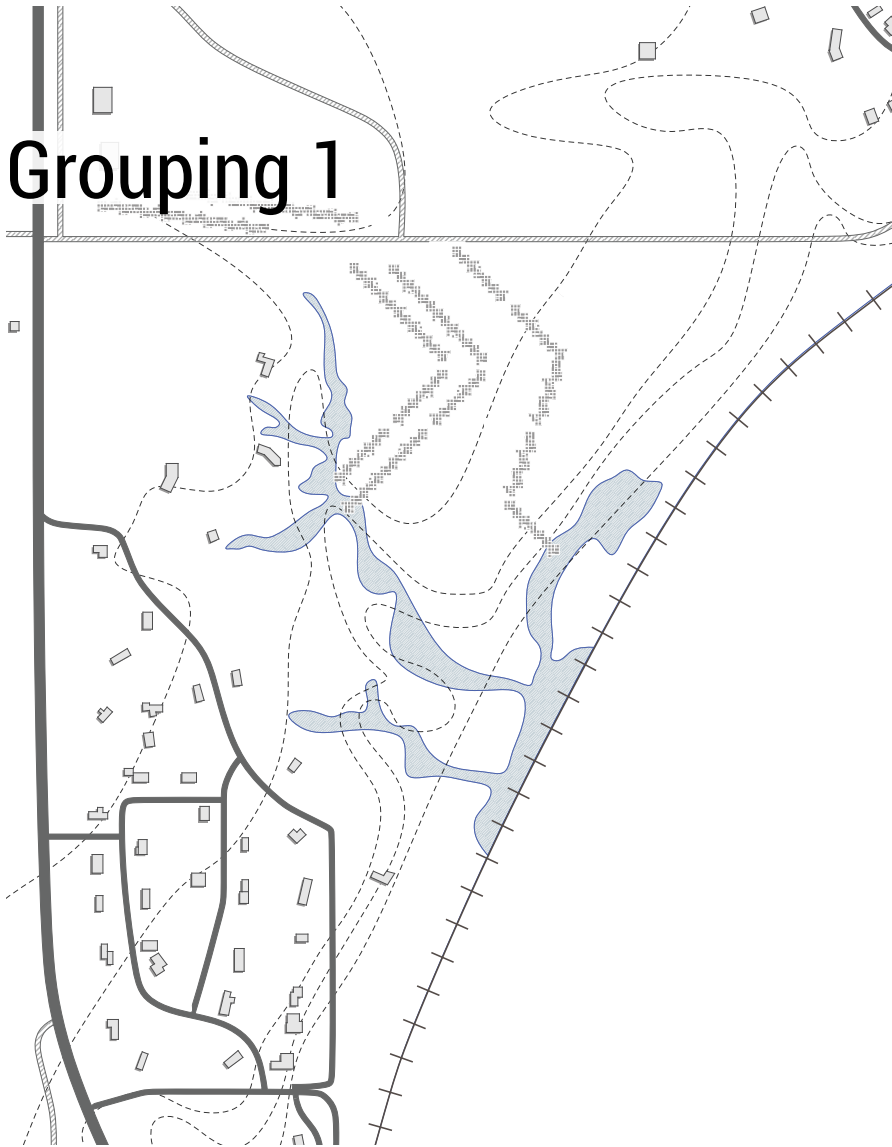


For each new site, what is necessary are both private and public zones. Each site requires public parking with access to each of the activity areas as well as private parking and access for the residents.





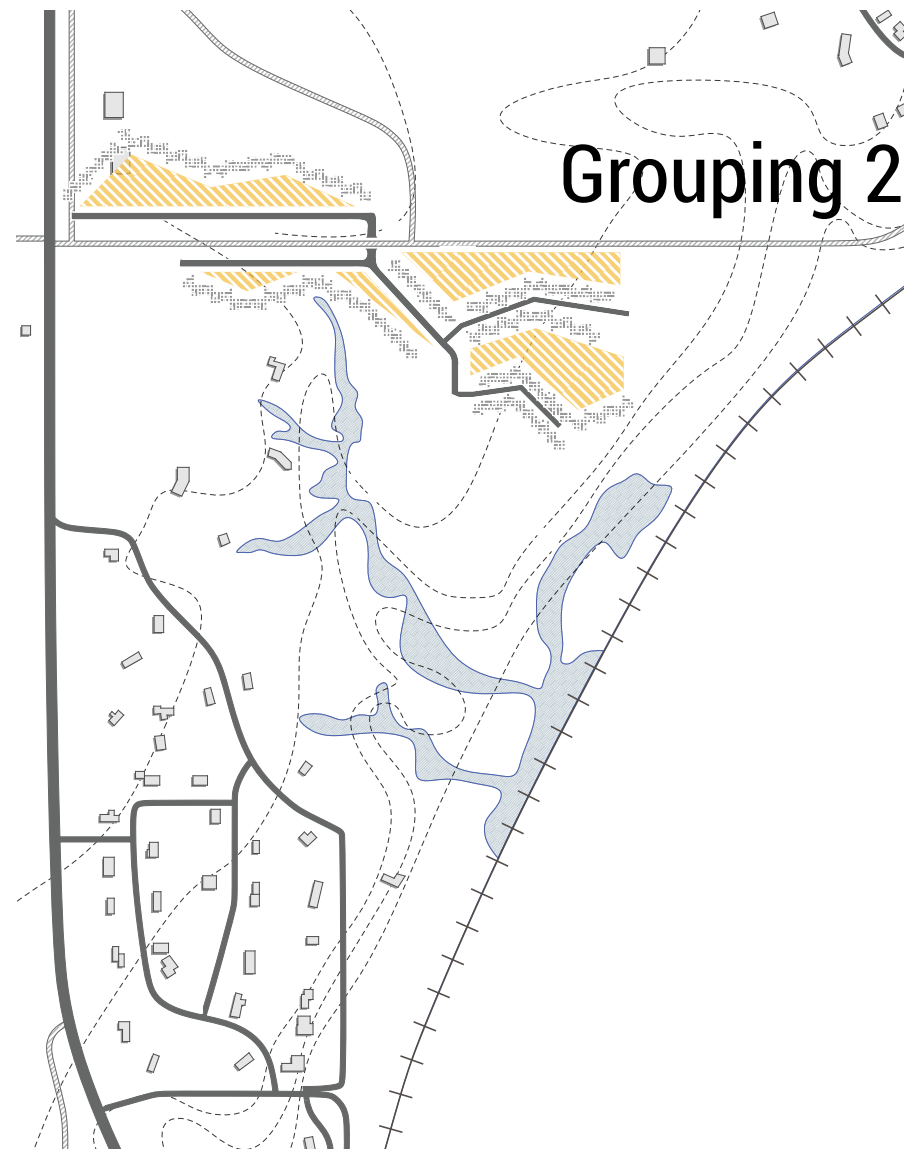
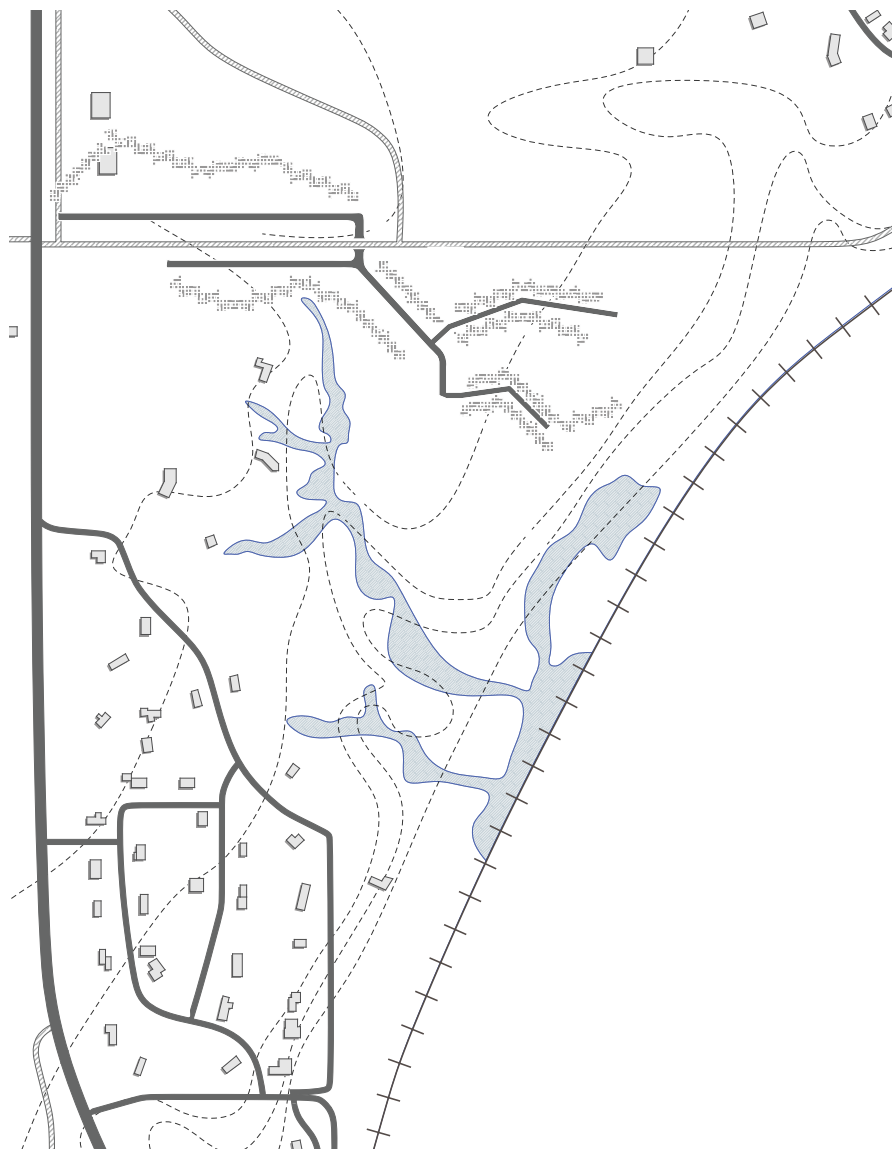
Grouping 1



Each organization on site uses the three stacking variations and attempts to create, not only a development for the present housing needs, but also for the organization

of future activities. There is a need for large public activity areas as well as smaller zones for more semi-public resident activity. The following study into site organization is only a

small portion of the varieties that were studied but are meant to showcase the different types explored. Each type had a different organization for the residential units as well as for

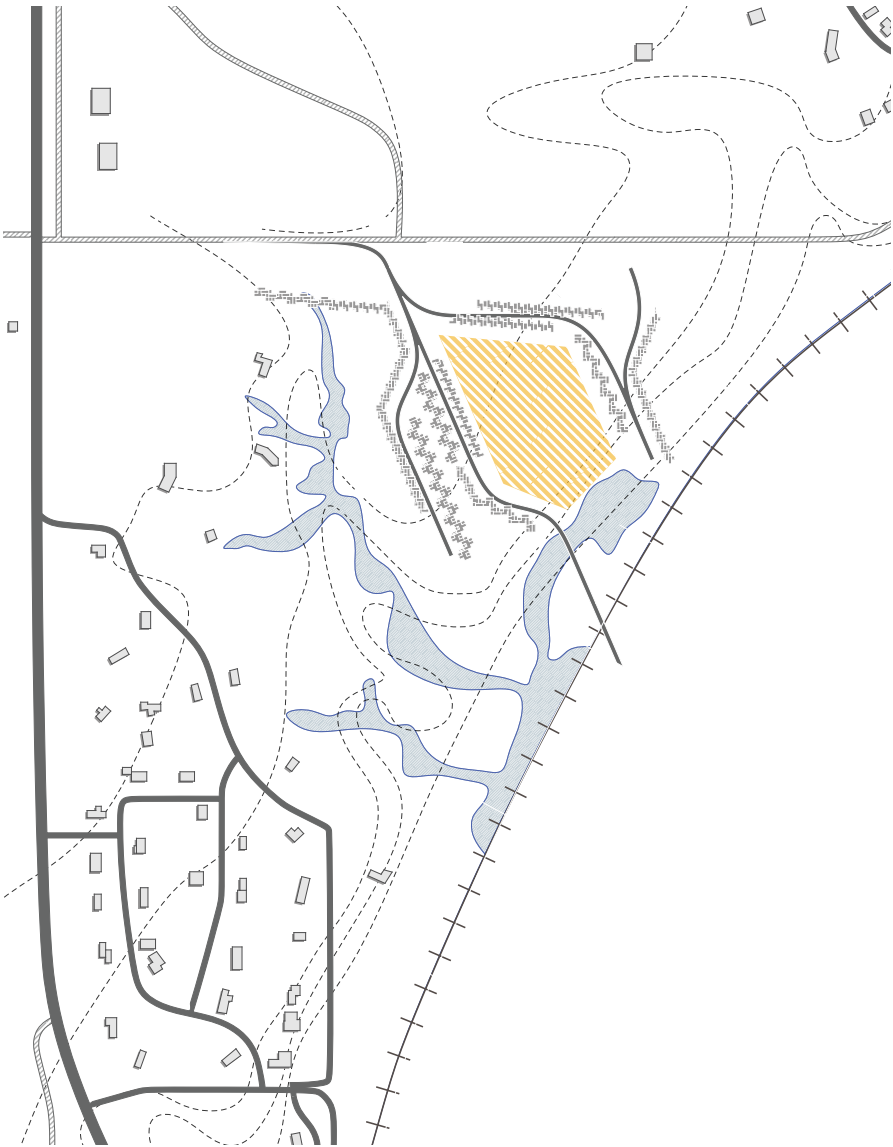
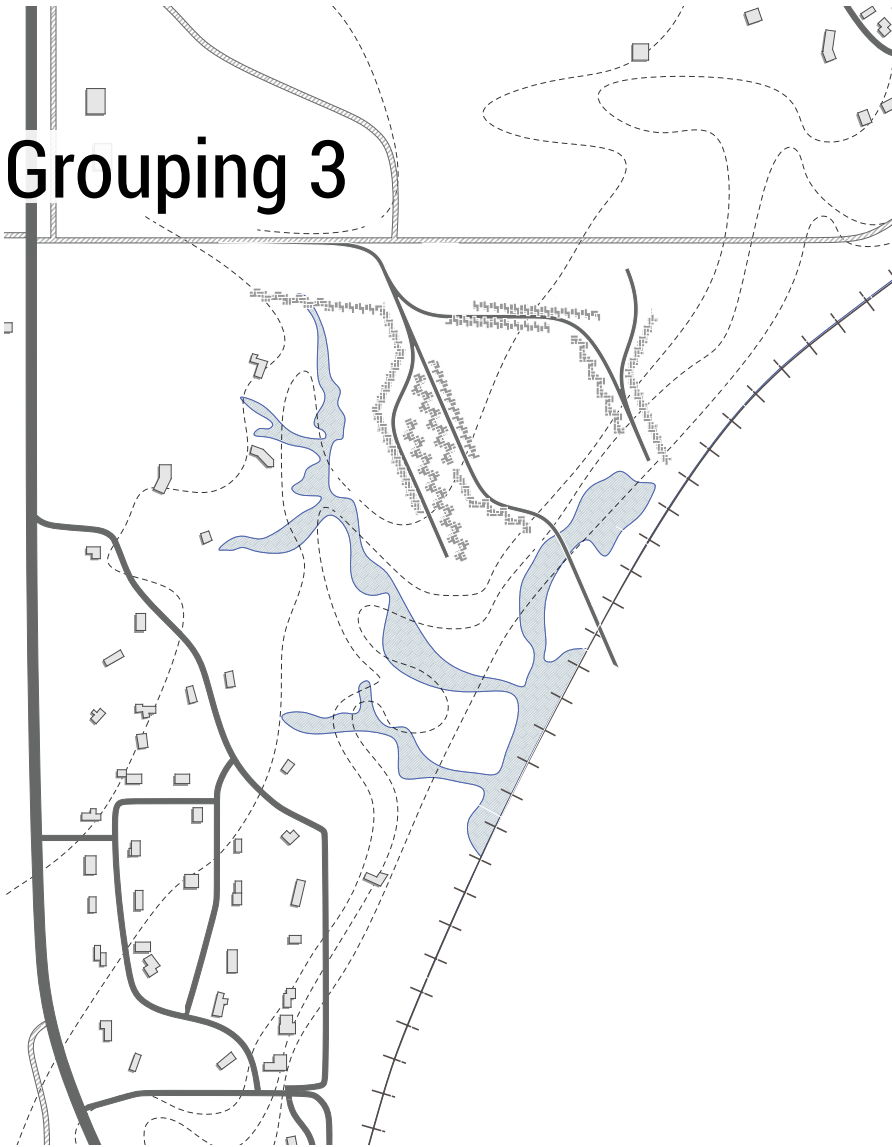


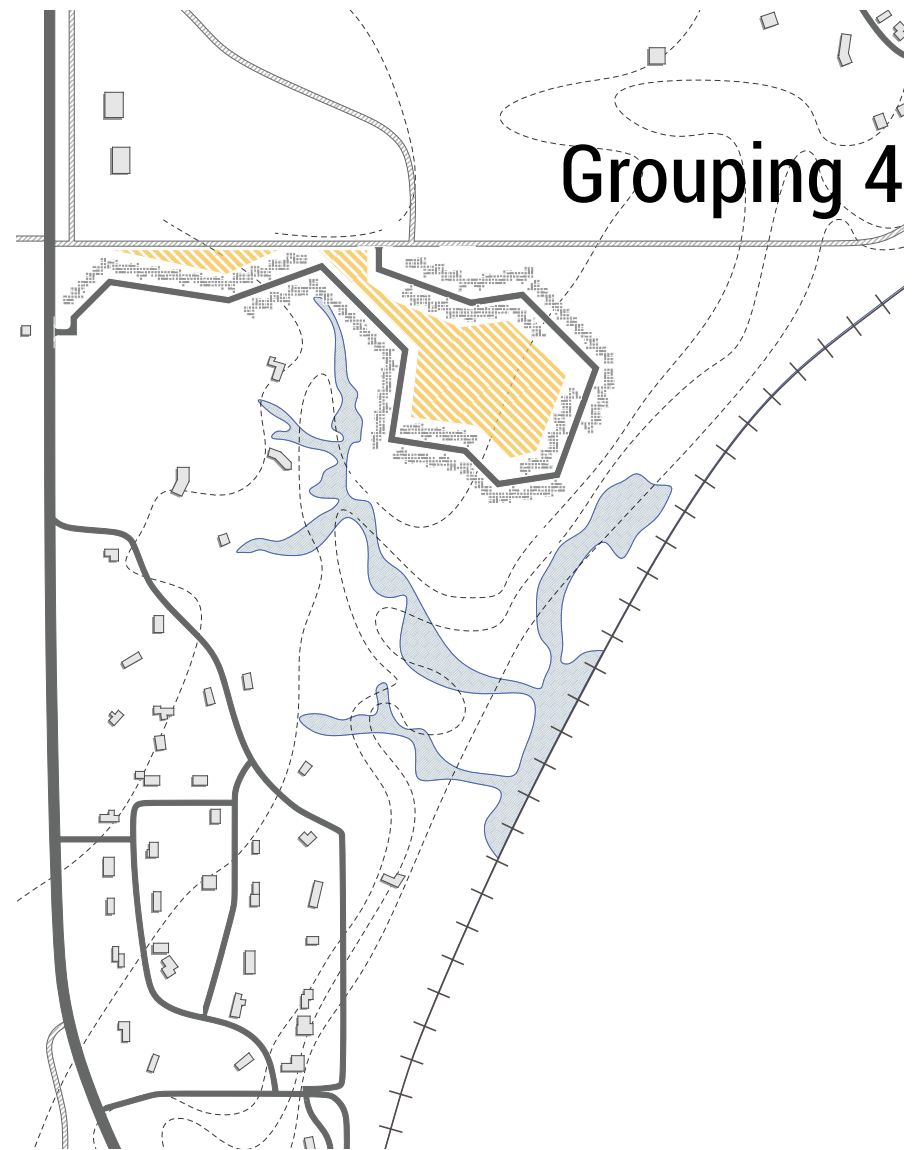
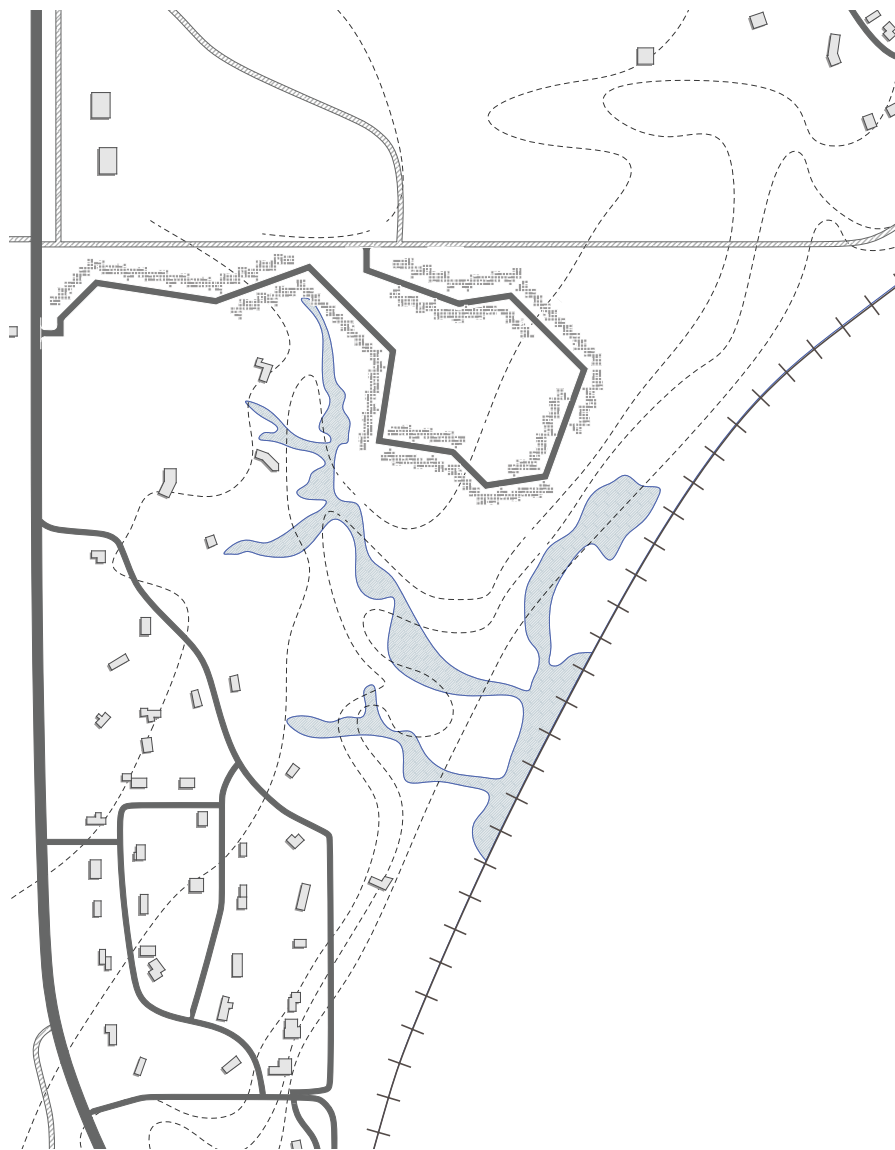
the public zones created by their patterns. The zones highlighted are the public activity zones created and show how the same amount of units can create such a variance in zones just

in how they are laid out on site. Each variation comes closer to the desired effect on site which balances the public, semi-public and private zones, as well as circulation on site which will

effect the future use of the site.

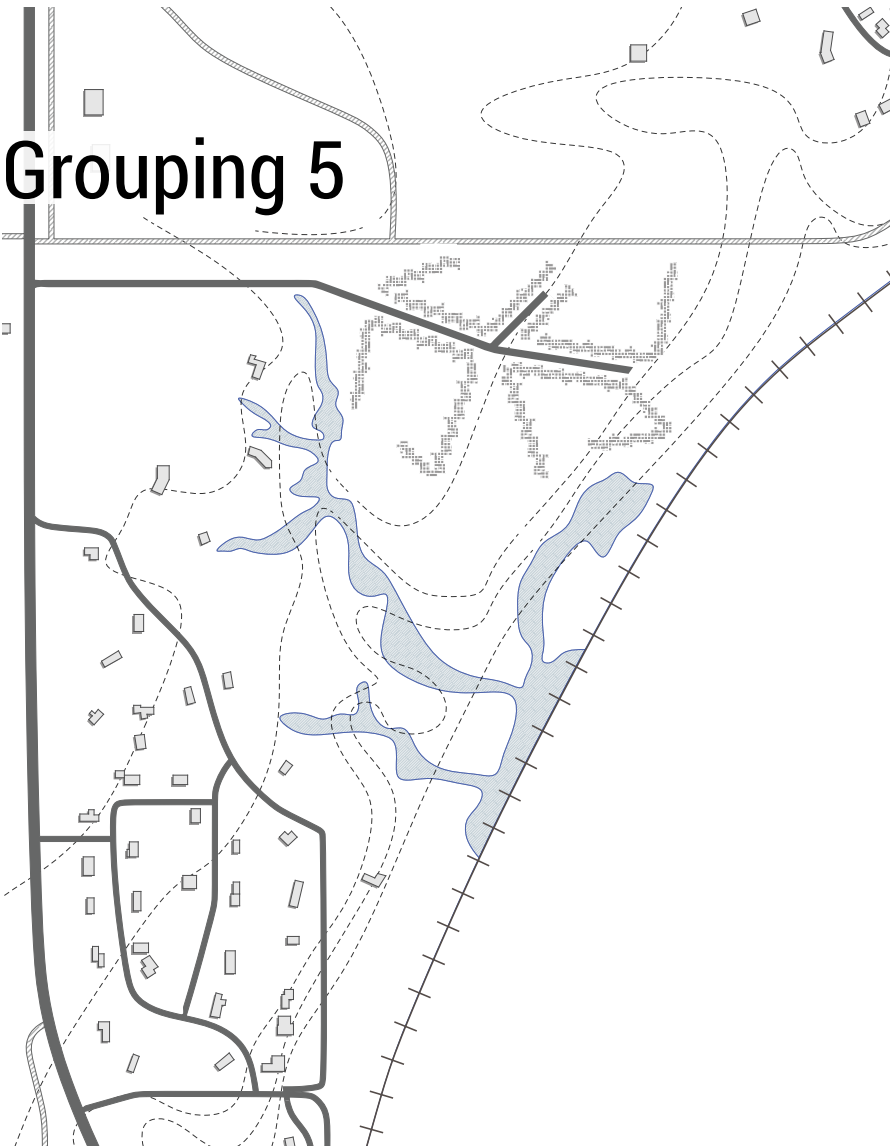
Grouping 3

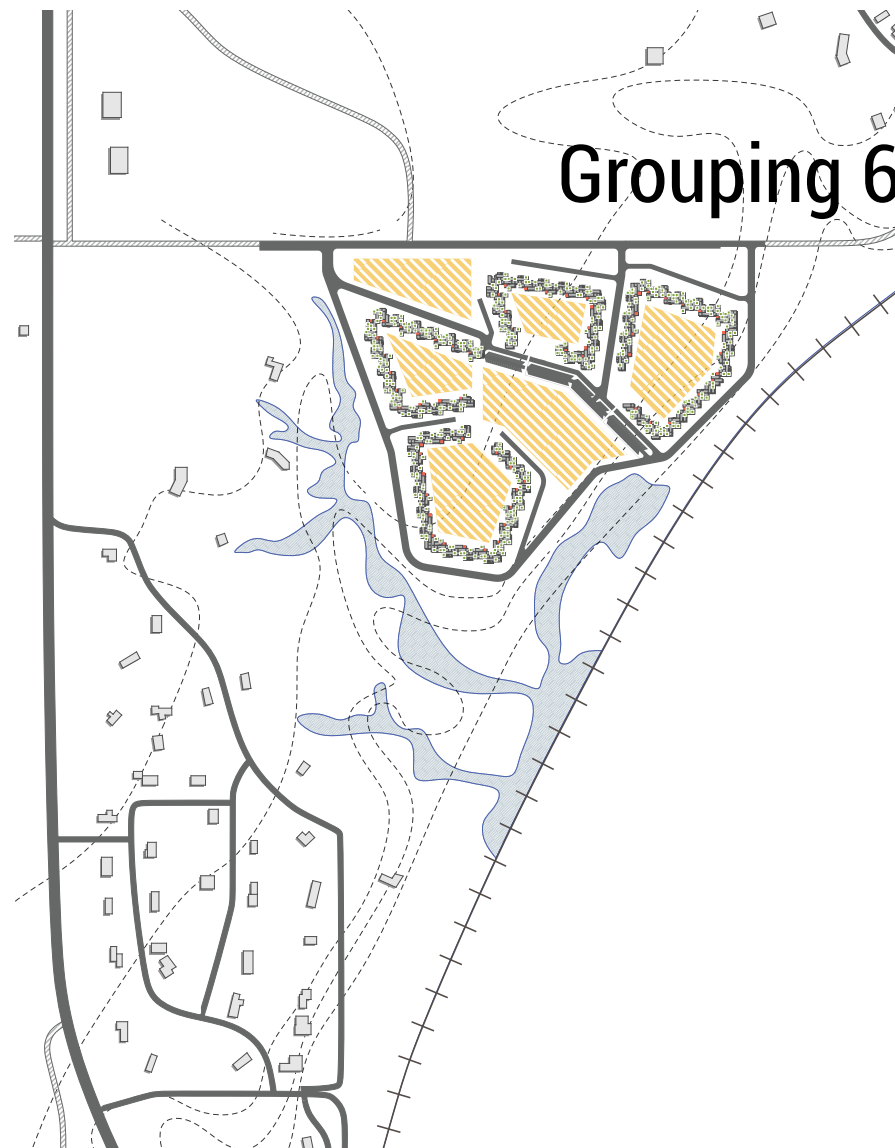
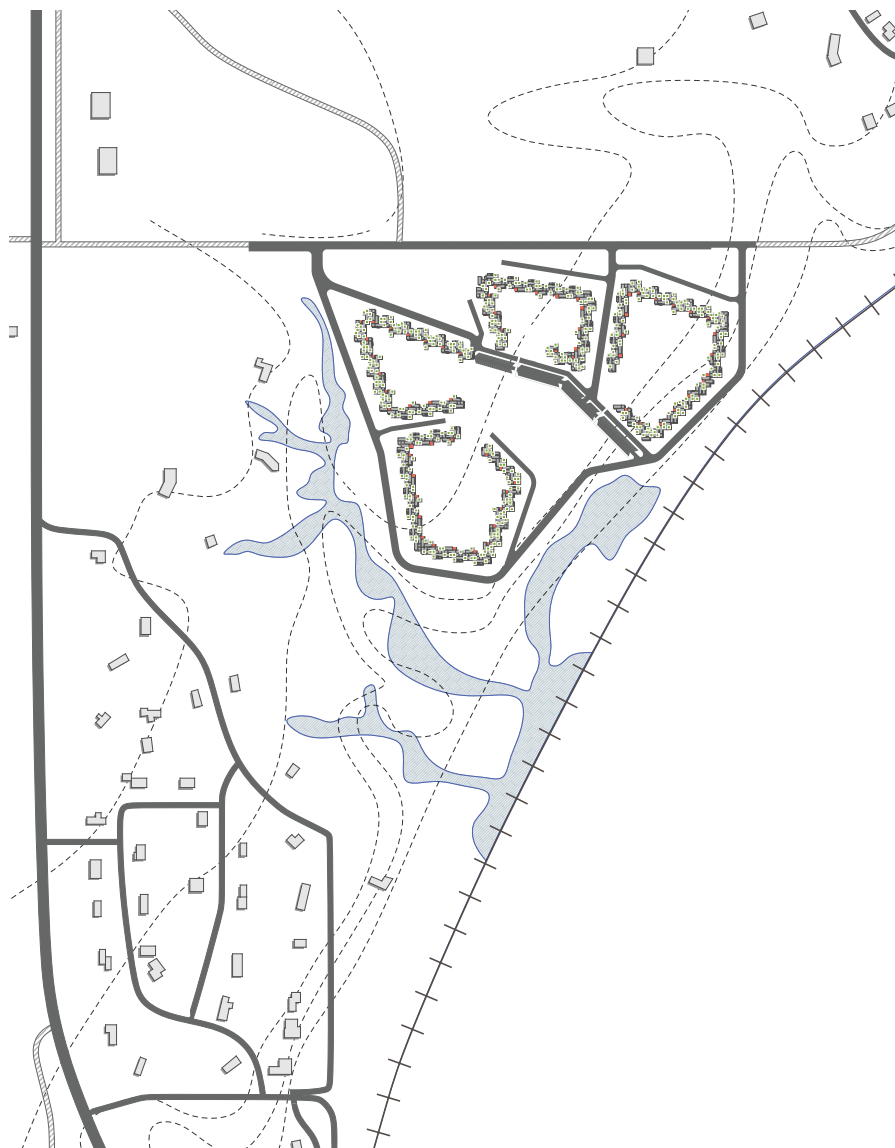




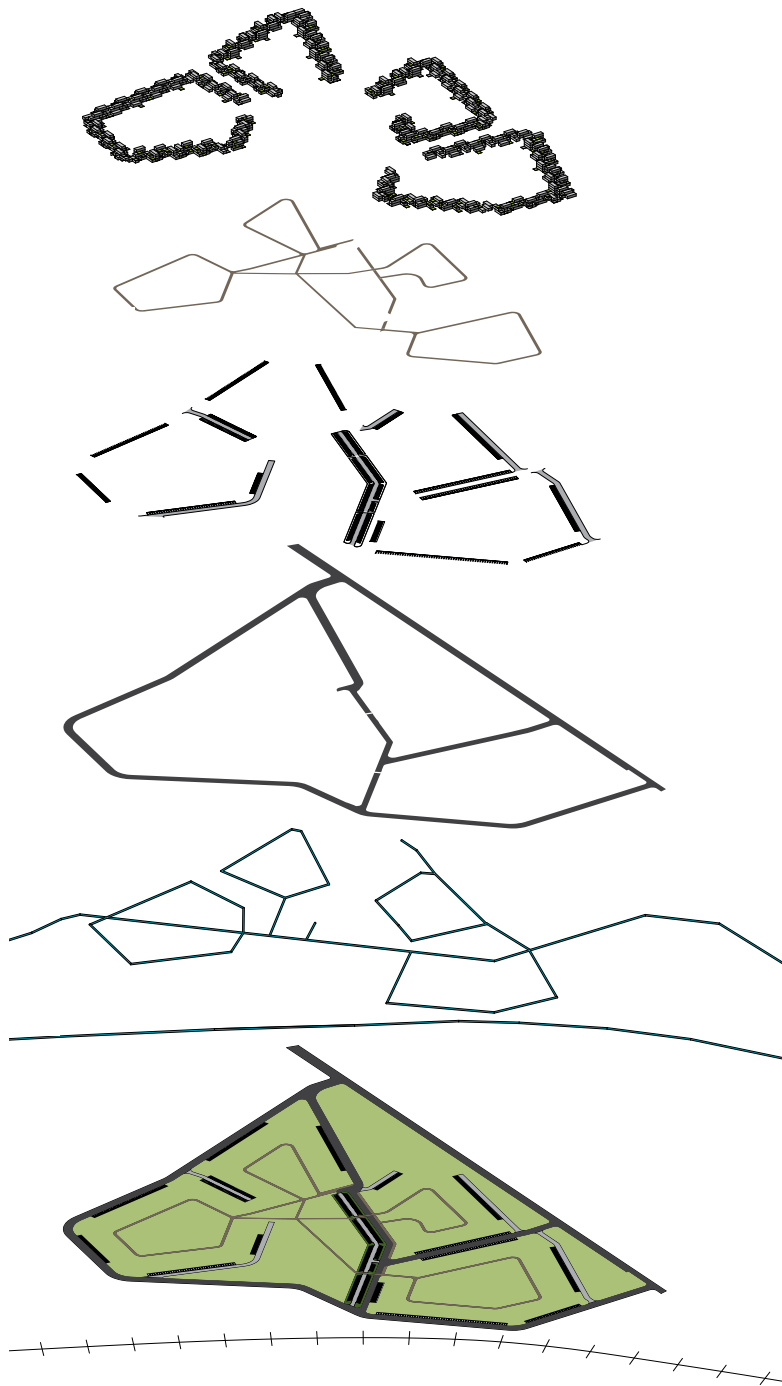
Grouping 4

Grouping 5









Final Site Layout

The final grouping is successful in creating group event areas and private residential areas as well as creating an infrastructural base for future use. The surrounding roads and parking lots help to frame spaces that, while being used as a residential development, create smaller communities. When the homes are no longer necessary and are relocated, the circulatory frames continue to frame sections of land that can either be naturalized and return to wilderness or be utilized for city functions.

Each of these zones could become a play ground, a dog park, a skate park, picnic shelter, sports fields, community garden, skate rink, or band shell. It can also be available for small retail spaces. The activities can be utilized by the residents of the development, the residents of nearby man camps or residents within Williston. The walking trail creates a 1.2

mile connection to each of the separate zones. Activities can be scheduled for the use of the public zones such as tournaments, farmers markets or concerts. While population in the city is heightened the development can be utilized greatly.

When the housing is gone, the city can continue to use the activity zones. The need for more activity may decrease as population reaches a smaller, more stable number and sections of the development can slowly return to agricultural or wilderness uses.

Phase 1

Site is chosen for the immediate development of the new housing community.



Phase 2

Main infrastructure and circulation is put in place.



Phase 3

Public and private parking areas are put in place with the surrounding circulation.



Phase 4

Pedestrian trails are laid out and public zones are defined.



Phase 5

Housing units are assembled on site.



Phase 6

Public activities are introduced and utilized.



Phase 7

As the need for housing lowers, housing is able to be disassembled and relocated.



Phase 8

Housing is relocated, leaving circulation and public areas for continued community use.



Unit Detail Renders





Farmers Market and Shelter



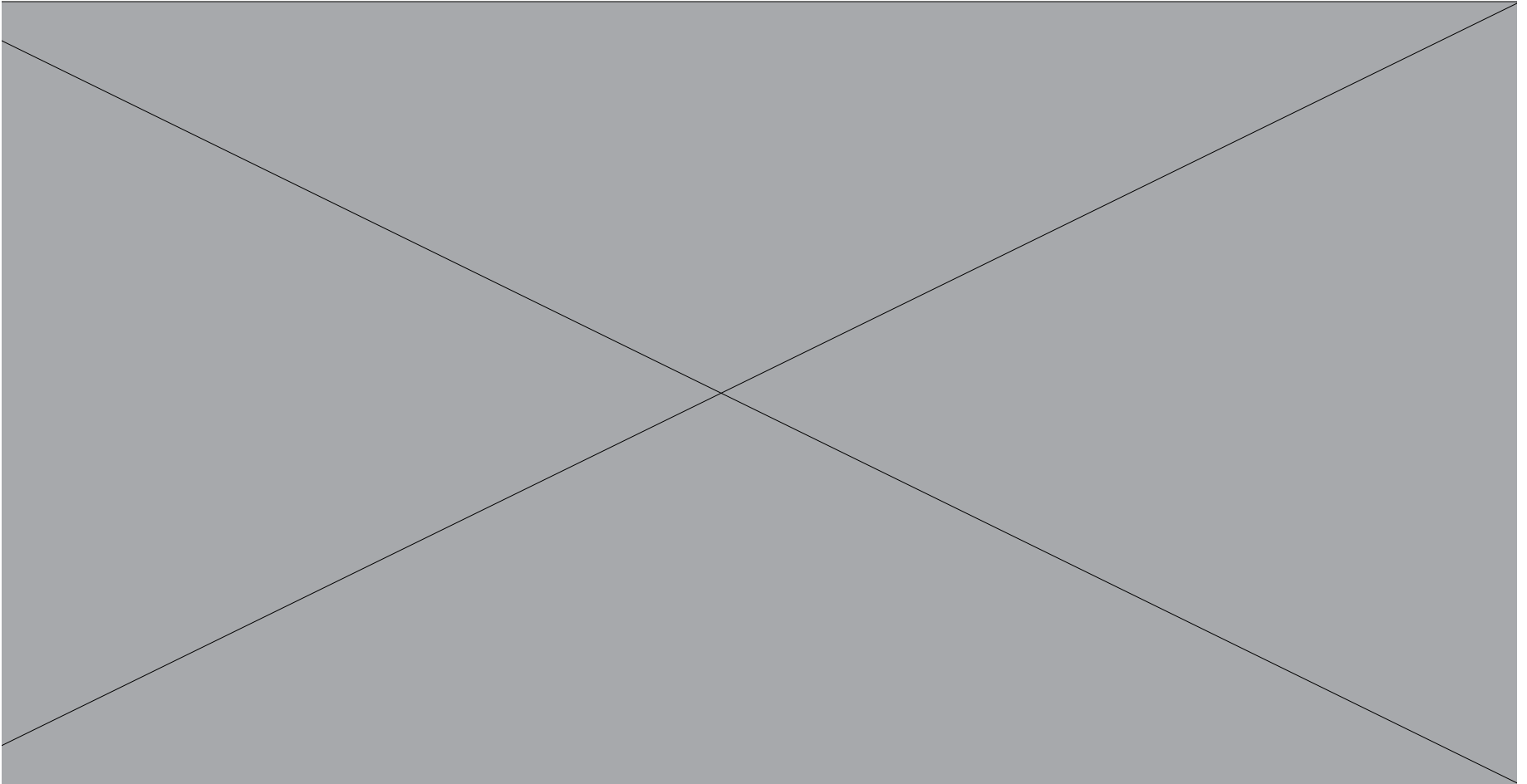
Playground



Community Garden [During Boom]



Community Garden [After Boom]







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